

*"Damn it Jim, I'm a Doctor, not a...": An Extrapolation of the Societal Role and Identity
of Doctors and the Medical Profession as seen through the lens of Science Fiction Film
and Literature*

An Honors Thesis (HONR 499)

by

Samuel J. Cohen

Thesis Advisor
Robert Benson

Signed _____

Ball State University
Muncie, Indiana

May 2016

Expected Date of Graduation

July 2016

SpColl
Undergrad
Thesis
LD
2489
.Z4
2016
.C64

Abstract

Doctors have always been a profession of intellect and altruism, using scientific knowledge to for the wellbeing of their fellow man. Many periods of history have created changes in the role of this prestigious profession in society. In the contemporary medical world, many changes are taking place that affect the form and function of the physician. Science Fiction is a genre of fictional entertainment with great speculative capability into the future of mankind. Its rich history in films beginning in the 20th century, and literature as early as the 16th century provides many examples in which authors have correctly acted as futurologists in accurately describing the world of the future. An analysis of physician characters in Science Fiction along with knowledge of the changes taking place in the modern medical world allow for conjecture into the future of the physician as a healthcare professional.

Acknowledgements

I thank Professor Robert Benson for advising me as my thesis mentor throughout the tumultuous production of this thesis. He remained with me during times of personal difficulty and his comprehensive knowledge of science fiction was invaluable. I could not have chosen a better mentor.

Table of Contents

| | |
|--|-----|
| Chapter 1. <u>Introduction</u> | 1 |
| Chapter 2. <u>Science Fiction as the genre of choice</u> | 5 |
| Chapter 3. <u>Brief History of Medicine (through out real-world history)</u> | 15 |
| Chapter 4. <u>Role of the Physician (through out real-world history)</u> | 26 |
| Chapter 5. <u>Medicine in Science Fiction</u> | 32 |
| Chapter 6. <u>The Doctor in Science Fiction: History of the Character</u> | 41 |
| Chapter 7. <u>The Doctor in Science Fiction: Trends seen in the genre</u> | 48 |
| Chapter 8. <u>The Doctor in Science Fiction: Archetype 1: <i>Same-era doctor, new equipment</i></u> | 54 |
| Chapter 9. <u>The Doctor in Science Fiction: Archetype 2: <i>Return to Mysticism</i></u> | 63 |
| Chapter 10. <u>The Doctor in Science Fiction: Archetype 3: <i>Doctor turned to Technician</i></u> | 71 |
| Chapter 11. <u>An Aside into Star Trek: Progression of the crew's Medical Doctor between series</u> | 80 |
| Chapter 12. <u>The Changing Contemporary Medical World</u> | 88 |
| Chapter 13. <u>The Modern Doctor</u> | 93 |
| Chapter 14. <u>Concluding Argument</u> | 102 |
| Chapter 15. <u>Conclusion</u> | 106 |
| Bibliography | 110 |

Chapter 1. Introduction.

A character is an element of fiction. On many occasions a character is more than just an agent to advance the plot. They are able to instill an emotion in the reader, affect the world in which the fiction exists, and therefore hold some reflexive qualities about the world over which their work of fiction presides.

While fiction allows one to better perceive the current day, Science Fiction allows one to glimpse the future. Science fiction can be described as a genre of entertainment that presents an author's vision of the future of humanity. Many aspects differ from those of our present world: travel, communication, city infrastructure, medicine, food, lifestyle, music, weaponry, and technology. Thus, by analyzing the role of a profession—namely the medical doctor—in science fiction we can induce the medical world of the future, speculate about the role of the physician in the future, and examine how it relates to today's changing contemporary medical world.

The intent of this thesis is to observe and analyze the role of the medical physician as it is depicted through characters of science fiction film and literature. The project will examine the presence of and trends involving the physician career in science fiction films and literature, the generally depicted archetypes of the career, and its place in the future-society. This thesis will include both film and literature in its approach to the topic, but with the emphasis on film.

The modern world of medicine is changing with a divergence from the caretaking realm into more of a business-driven institution. This thesis will examine these changes taking place today. By citing science fiction films and literature as examples, it will also critique which works of science fiction extrapolate a plausible, sustainable, and (even) creative portrayal of the actual medical profession in the future of humanity.

Throughout my educational experience the medical world has been intriguing as a possible future career path and throughout my life science fiction has

always been one of my favored genres of fiction. With regards to my college studies as a chemistry pre-medicine major, this thesis has broadened my academic scope to include and understanding of the physician career in the contemporary medical world. As an honors student, the viewing of various science fiction works has provided me with a comprehension of an explicit genre within the humanities. It allowed me a succinct glimpse into "how science fiction authors think".

The thesis first begins by outlining science fiction as the choice in genre to be examined. Describing how it is a projection of the future, it accredits it as a source of futurology. A brief history of science fiction film is given, and accurate predictions made by the genre are noted.

The thesis then explores some background information by examining the field of Medicine in the real world, beginning with a brief real-world history of medicine. It also points out the importance knowing this real-world history has on the understanding of the thesis. The thesis then presents the history of the physician profession and their role in the world up to modern day.

The thesis then discusses medicine within the genre of science fiction. It defines worldbuilding as it is used in science fiction and expresses the importance of a well-illustrated medical infrastructure within a science fiction work. Examples of medicine in science fiction and how it is perceived are provided. Accurate medical predictions made by past works of science fiction are revealed (as well as those that have not yet been realized by today's technology).

The thesis then identifies common varieties of characters within science fiction film and literature. It then evaluates the doctor character in general fiction. The thesis then indicates its place among the other characters in science fiction before identifying the significance of the role in the progression of the science fiction narrative. Commonalities between the doctor characters in various films are identified. The thesis then evaluates broader, more typical character tropes that are observed of physician characters. Following, this I present three thesis character archetypes of the physician character in science fiction film and literature.

The thesis then explains the first archetype as a contemporary representation of a physician existing in a future age. Examples of this archetype are

provided. The thesis then elaborates on the connotations of such an archetype and evaluates the possibility of such a future doctor.

The second archetype is explained as a return to past representations of a medical doctor. Examples of this character archetype are described and the science fiction subgenres in which this archetype most frequently exists are commented on. Following this, I evaluate the possibility of this extrapolation of the medical profession.

The thesis goes on to define the third archetype as a product of near-complete medical scientific knowledge resulting in a loss of humanity in the career. The thesis delivers examples of this character archetype. The thesis then comments on the probability of this physician being representative of our future doctor.

In an aside I examine more deeply the series *Star Trek* and the varying doctors in each series installment of the show. By analyzing the progression of the Chief Medical Officer through the series', the thesis seeks to determine the meaning, if any, behind such an "evolution".

Having finished its analysis of works of science fiction, the thesis then describes the modern medical world as perceived by today's professionals. It then presents the ways in which the medical world is changing and briefly touches on what imminent effects this might have on the physician. The thesis seeks to understand the modern doctor. It first explores its adaptation in the contemporary medical world, then comments on its possible place in future society. It discusses which examples of doctors in science fiction film and literature are best comparable to the contemporary doctor and the possible future doctor.

With the history and genre of science fiction explored, the physician character archetypes presented, and the modern doctor's place in the changing medical world illustrated, the thesis will make a final supposition on the most probable science fiction view of the future physician in the real world. Any unresolved questions or discussions will also be concluded at this point. The thesis then restates major points before transitioning to closure, after which a list of sources referenced are displayed.

This thesis project will serve as a resource for many academic arenas. It will offer reason into how a work of entertainment can be utilized as a powerful speculative force. It will show a critique on an unlikely area of the science fiction genre, namely, the use of a seemingly commonplace profession as a means of worldbuilding and unintentional futurism. It will offer a brief analysis of many examples of film and literature. The thesis will postulate on the future of the healthcare domain and the medical profession of the physician. In addition, it will depict some examples of developing fields of technology and illustrate themes related to human society and social interaction. This thesis will offer insight to those of many disciplinary fields and thus has a large target audience, such as medical/healthcare professionals and those wishing to enter those fields, and those involved in literature, advancing technologies, and the humanities.

Science fiction is a genre of fiction with a deep history than ranges many subgenres and comprises much variation through the ages of its creation and development. It was chosen as the “setting” for this thesis due to its proficiency as entertainment as well as its ability to provide a means of speculative futurology and to serve as a background for social commentary. Thus, it proves more beneficial than even the prime time medical drama to explore this genre when assessing the future state of our revered medical doctors in the changing world of modern healthcare.

Chapter 2. Science Fiction as the genre of choice.

Science fiction explores the ramifications of innovation and scientific advancement on human beings. Science fiction can be described as a genre of entertainment that presents an author's vision of the future of humanity. Many aspects differ from those in our present world: travel, communication, city infrastructure, medicine, food, lifestyle, music, weaponry, technology, politics, social interaction, etc. For that reason, it is generally viewed as the primary form of speculative fiction and possibly a means of technological inspiration. Though pure futurologists might argue that anything incorporating a presentation for the sake of drama is nothing more than "guesswork", many may still see science fiction as quality speculation. When an author or director can correctly include modern scientific understanding of the universe, the final work is much more than an advanced form of fireside storytelling. True, the earliest forms of fictional speculation may have started as myths or fables utilized to explain natural phenomena. Science fiction, for most of the genre's existence, has served as a way to conjecture about the unknown. This is different than a modern mythos. Science fiction often begins with one of two premises: (1) It presents a change in society as we know it, and postulates its affects—a "What if?" scenario—or (2) it uses current knowledge of modern technological advancement to imagine society and human interaction in a future time period. (Sometimes a work of science fiction will do both.) Science fiction rarely seeks to explain scientifically advanced phenomena itself. The science fiction that does is often quickly panned for its inaccurate, incomplete, or imaginative explanation.

Some of the best works of science fiction can actually predict the future of humanity. This may be due to good estimation, yet it would also make sense for science fiction to inspire innovation. In an article discussing the use of science fiction as a means of Futurology, writers of *The Economist* express that certain science fiction predictions may be self-fulfilling in that they "inspire inventors to

implement it." [1] Being "particularly popular among people of a technological bent", science fiction "frequently provides the motivation for real-life innovation." [1] In fact, the first atomic submarine was named after Verne's "Nautilus" and the first space shuttle took its name "Enterprise" from Star Trek. Referencing the communicators used in *Star Trek*, the writers conclude by asking "where do you think they got the idea for those mobile phones that flip open?" [1].

It's because of its additional utilization as a form of speculative fiction that science fiction maintains as a choice for analyzing modern extrapolation of what the future holds for the profession of the physician.

Science fiction in the modern context is a relatively modern genre of film and literature. Yet, primitive elements are present in much fiction throughout history. The ancient Greek legend of Jason sailing the Mediterranean guided by the Mass of the Argo is not that different than the modern narrative of Dr. Bowman exploring the reaches of space with the guidance of HAL 9000. According to the writers of scfilmhistory.com, while "scientific investigations toppled myth after myth... This gave rise to an increase in fantasy fiction, about voyages to the Moon instead of across the Mediterranean." [3]. The writers went further to regard science fiction as the "medium of choice for playing out futuristic fantasies or commenting on contemporary social ills." [2].

These science fiction elements exist as early as ancient history, and as late as the beginning of the 16th century. We see the roots of science fiction in works of Thomas More's *Utopia* (1516), Sir Philip Sidney's *The Countess of Pembroke's Arcadia* (1590), Jonathan Swift's *Gulliver's Travels* (1726), Voltaire's *Candide* (1759), and Mary Shelley's *Frankenstein* (1818). These works could even be considered "proto-science fiction". All show examples of scientific conjecture and social commentary. It is worth noting that in creating *Frankenstein*, "Shelley is the first writer to move beyond the 'fantastic voyage' for her sci-fi construct.", "the classic 'what if...?' scenario that has since become a standard paradigm for the genre." [3].

With the advent of the film theatre in the early 1900s, a new medium for depicting fiction and narrative allowed a new way for genres of literature and the imagination to be portrayed. Each genre entered the film cinema in its own manner.

Science fiction would correlate strongly with the scientific progress of its time, and its production would be strongly correlated with concurring special effects technology. The science fiction film genre seems to be one that acquires subgenres or tropes throughout the decades. These subgenres and motifs “boom” for a short period where we see them stylistically prevalent for the decade before “normalizing”, being then acclimated into the genre in a more subtle, yet consistent fashion. The primary purposes of science fiction have remained the same in the cinema: a means for projective speculation and narrative of action/adventure/epic proportion. Its secondary objective would be just as ardent: a tool for social commentary, as well as comedy in the form of parody and satire.

Prior to the 1920s we see science fiction elements that will progress into major themes seen in science fiction film of the 20th century. It began as a European genre, and at the time science fiction was deeply intertwined with fantasy. Even early on, special effects were still a major aspect of science fiction films: often where new techniques would make their debut appearance. Drawing upon contemporary futurist literature, many early films drew upon such “futurist writers” as Jules Verne, and H.G. Wells. Alfredo Suppia of University of Campinas points out that “film and modern science fiction literature were born around the same time period.” [4] As such, early films might have even inspired written works.

French filmmaker Georges Méliès was majorly influential. In his film *A Trip to the Moon* (*Le voyage dans la lune*, 1902), he drew from Verne’s and Wells’ works, identified the theme of space travel, and “marked the beginning of science fiction cinema” [4].

Prior to the 1920s we also see the beginnings of social commentary in science fiction, and “Halley’s comet inspired the first science fiction disaster movie, *The Comet* (1910).” This first disaster film is significant in beginning the disaster thriller theme. Further, the production of *The Comet* showed that real-world events would begin to serve as the ideas for movies, but this would be especially common in science fiction. However, imagination does fabricate faster than technology. As the imagination of insightful individuals would eclipse technology later in the century, it would be that sci-fi film serves as an inspiration for real-world invention.

The pre-1920s era closed with other embryonic themes surfacing. Among those are the high-tech spy seen in the noir-science fiction mix (later to become the James Bond archetype film), the monster movie genre, and the mad scientist.

Science fiction film would be shaped in many different cinemas throughout the world. Differences in American and European cinema would cultivate different elements in the 1920s. Austrian-German filmmaker Fritz Lang's iconic *Metropolis* (1927) marks the onset of European use of science fiction for social commentary. It's groundbreaking display of a future dystopia featuring a relatable social class struggle and the creation of a robot-turned-android truly showcased what the genre would have in store for audiences in regards to prophetic speculation. The 1920s would also see science fiction as a craft to disseminate nationalism and propaganda in the Soviet cinema.

The 1930s were known as the "Wellsian decade" of science fiction. More "quality" cinema remained in Europe, yet in the U.S., more scientifically theoretical films would flop at the box office. American cinema saw a decline in speculative fiction as the subject matter, while low-budget, flashy films would take the form of mad scientist and comic book hero movies.

The horror genre would find its first tie-in with science fiction through the Mad-Scientist motif. Such was the case in the films *Frankenstein* (1931), and *The Strange Case of Dr. Jekyll and Mr. Hyde* (1932). The 1930s would also exhibit the themes of the horrors of war and the challenges of a technological utopia. The first 'film series' would rise at the close of the Wellsian decade in *Flash Gordon* (1936) and *Buck Rogers* (1939). This occurred as comics intersected into the world of science fiction film. Science fiction was largely dependent on its subgenres during this time period, being tied in closely with those mad scientist and comic book hero movies.

Suppia cites film journalist Phil Hardy, who states that Science fiction cinema was "somehow eclipsed in the cinema of the 1940s" [4]. However, out of the 1940s would be a rise of parody in Science fiction as South American cinema began to use sci-fi for comical purposes. Even American cinema created such comedies as *Abbott and Costello Go to Mars* (1953). The low-budget monster flicks would continue to

scare audiences in their sequels and the comic book heroes would stand valiant in their series.

The 1950s saw a rebirth of science fiction film. It was the beginning of modern spectacle, and the U.S. saw a boom of science fiction films to meet it. Both positive and negative events would define the era. Modern technological advancements of the 1950s would increase public interest in sci-fi films. Suppia cites Hardy: Anxieties like the post-World War II scene, the Iron Curtain, and communist paranoia in America “expressed and explored in a variety of ways created the science fiction film genre” [4]. Yet these political conflicts would fuel the intrigue that sci-fi cinema offered, leading to a boom in science fiction films and a concurrent escalation in science fiction literature.

The Thing from Another World (1951), *The Day the Earth Stood Still* (1951), and *The Invasion of the Body Snatchers* (1956) would show the 1950s saw the first of Cold War, alien invasion, and nuclear holocaust motifs. All three of these films support that prototypical purpose of portraying “futuristic fantasies and commenting on contemporary social ills” [2].

The 1950s would develop some more into the detective scene with some Noir combinations. One of the most central themes to science fiction found its start in the 1950s cinema: science and technology as something to be feared. Key films produced at the time were *20,000 Leagues Under the Sea* (1954) and *Forbidden Planet* (1956). Suppia writes: *Forbidden Planet* stands “for many writers and SF fans, the greatest American 1950s science fiction film”. Horror films moved past the mad scientist theme to develop Monster films, as modern technologies and nuclear radiation would intrigue larger audiences with movies such as *King Kong* (1952 re-release) and *Godzilla* (1954).

The late 1950s saw for more low-budget films aimed at youthful audiences; the phrase “B-movie” was coined. Many other films would re-hash themes, some from as early as the 1920s. An example of this is *Journey to the Center of the Earth* (1959), a film inspired by Jules Verne’s works. Thus, the old themes continued.

Following the initial 1950s boom, there were fewer films in the 1960s. Yet, as Suppia cites Hardy: this was the decade in which “science fiction becomes

respectable" [4]. The Science fiction-horror subgenre found a medical inclination in depicting advanced surgeries (e.g. transplants). The 1960s brought films portraying giant—and often radioactive—monsters, French dystopian love stories (*La Jetée* (1962)), and post-apocalyptic (*The Last Man on Earth* (1964)). South American cinema presents sci-fi comically, in the form of parody and some political satire. Uniquely, in Mexican sci-fi cinema we see 1960s films that star famous wrestlers. These movies take on an almost early "action hero" feel to them with their repeated starring of the actors in similar plots. The science fiction zombie first arises in George Andrew Romero's *Night of the Living Dead* (1968). It appears that this more fantasy trope would emigrate fully to the sci-fi genre in the decades to come. Science fiction films remained as real-world predictors. Suppia points out: "*Invasion* is an [Brazilian] SF movie that anticipates the military dictatorship that would befall Argentina" [4].

The late 1960s saw some of the most memorable science fiction films of the century, as American sci-fi cinema took a more philosophical route. It is through these films that the genre became "respectable". A few key films display more advanced themes. Based on the Daniel Keyes novel *Flowers for Algernon*, Ralph Nelson's 1968 *Charly* exhibits scientific experimentation that attempts to improve Human mental capacity. Sparking a series of films, the original *Planet of the Apes* (1968) was the first to show a scenario when Earth is mistaken for another planet. In 1968, Stanley Kubrick's *2001: A Space Odyssey* was pioneering for its time. Quoting Hardy, Suppia relates that this film "transformed both the look and the budgets of science fiction films" [4]. Indeed, the special effects present, the realism in the science depicted in the film, and the epic proportion of the narrative made *2001* groundbreaking for its time. It still stands today as a paragon in science fiction cinema.

Manned trips to the Moon drove and increased interest in science fiction in the 1970s. Subjects from the past continued, such as the theme of paranoia. Except the government or a corporation would replace the previous Communist fear. *Logan's Run* (1976), and *Soylent Green* (1973) both demonstrate this theme. The end

of the 1970s brought audiences *Star Wars*. This 1977 film saw a level of success that would make sci-fi a highly profitable film genre in the 1980s.

The 1980s saw a rise in “escapist” premises. This would unfortunately slightly decrease the credibility 1980s science fiction films would have in terms of prophetic speculation as a means of Futurology. In addition, the lines defining the genres of Science Fiction, Fantasy, and Superhero would become less distinct as the categories started to blur.

The rise of the Internet would spark a cyberpunk genre in the 1990s, and in the 2000s science fiction films largely continued with the genres created in the decades of the past. Also notable in the 2000s is a resurgence of films that utilize science fiction for political commentary purposes. True, modern sci-fi films share such similar primary intentions. Nonetheless, each film is varied. There are still distinctions among cinemas of different countries. It is science fiction film’s diverse history over the past century with which it gains its rich culture and with which Suppia calls it a “true mythology of our times” [4].

The speculative potential of science fiction film has proven itself continuously. Nineteenth century author Jules Verne’s *From the Earth to the Moon* predicts the capability of mankind to land on the Moon, as does the 1950 film *Destination Moon*. The better-known *Twenty Thousand Leagues Under the Sea* exhibits Captain Nemo in a nuclear submarine. Author H.G. Wells would predict modern weapons of war in his novels. Tanks and Atomic Bombs are present in *Land Ironclad* and *The World Set Free*, respectively.

In current times, listening to your headphones is commonplace. It’s difficult to imagine a world in which we listened to one another more so than our electronic devices. However, it was in such a world that Ray Bradbury predicted the use (overuse) of earphones in his novel *Fahrenheit 451*. In fact, the manner in which the character Millie uses her “seashells” does not sound much different than a listener today would:

And in her ears the little Seashells, the thimble radios
tamped tight, and an electronic ocean of sound, of music

and talk and music and talk coming in, coming in on the shore of her unsleeping mind. [5]

The hyper-sensationalism depicted in the novel reflects sensationalism of the time. For example, the first forms of three-dimensional film were beginning in the 1950s.

In *Minority Report* we see Gesture-based User-Interface for computers. Augmented reality may soon experience a rise in more commercial use. Touch screens are pervasive in our current technology and it is not uncommon to see one speak directly “to” their phone. Such a voice-based user-interface as seen in *Minority Report* or more notably in *Star Trek* would be accurate predictions of today. In fact, user-based interface of virtual reality does not greatly differ. Additionally, the flip phones used prior to smart phones look oddly similar to the communicators used by Captain Kirk and Mr. Spock. At times when simply hearing someone’s voice was enough, *2001: A Space Odyssey* (1968) and Hugo Gernsback’s *Ralph 124c 41+* (1911) would show a future where video calling on computer displays and video phones was the norm.

Another feature in *Minority Report* was targeted advertising to the individual. Though not (yet) experienced when walking in the shopping mall, it has become all too real in pop-up and banner advertisements online. Personal assets like Credit/ATM cards were once nonexistent. It was author Edward Bellamy who envisioned such electronic methods in his novel *Looking Backward: 2000-1887* (1888). More commonplace in today’s world is computer ubiquity. The connectivity of all of an individual’s personal electronic devices is so ordinary in science fiction film that it almost seems an innovative “expectation” from the minds of science fiction writers.

Children of the 60s and 70s were entertained watching the Jetsons in their future homes consisting of robot vacuums and flat screen televisions. The young viewers had little knowledge that their own children might have such appliances in their own homes.

Neuromancer, by William Gibson, gives an accurate depiction of cyberspace and computer hackers well before its time. In his article "Science fiction predictions are surprisingly accurate", consumer technology writer Paul Croke writes about the speculation of the internet: "Vernor Vinge, former math professor at UC-Irvine, for instance, predicted the World Wide Web in his 1976 novel *True Names*" [6]. Croke further identifies Aldous Huxley's Soma (*Brave New World* (1932)) to modern psychological pharmaceuticals, saying "Many moderns compare soma to either antidepressants or sedatives such as Valium or Xanax."

On a more macro-scale, Science fiction writer Robert Heinlein would predict the American invention of an atomic weapon in *Solution Unsatisfactory* (1941) and the nuclear disasters at Chernobyl and Three Mile Island in *Blowups Happen* (1940). George Orwell would infer a modern surveillance society in *1984*. Croke notes that in *The Space-Station – Its Radio Applications*, Arthur C. Clarke was the "first to popularize the notion of satellites in geosynchronous orbit, used as relays for radio and television signals, the basis of today's worldwide telecommunications systems" [6]. Croke points out a stunningly, acutely accurate portrayal of today's social and scientific state:

"Probably the most accurate portrayal of today's social and scientific state is John Brunner's 1969 novel *Stand On Zanzibar*, which painted a bleak vision of 2010 in which we are governed by a President Obomi, Detroit is an abandoned ruin whose remaining citizens listen to new forms of electronic music, the country is plagued by random, senseless shootings, even at schools, terrorist attacks occur with alarming frequency, and cars are powered by rechargeable fuel cells." [6]

Science fiction holds incredible dependability as a source for speculation into the scientific, technological and even social advancements of humankind. Being a diverse genre with a rich, multicultural history, it is enjoyed by casual moviegoers

and devout fans alike. Being at the forefront of imagination it serves as inspiration to those inventors and thinkers of our society. For these reasons, science fiction film is an appropriate venue in which to extrapolate the future of the healthcare world and to conjecture the future of the medical doctor.

Chapter 2 Bibliography

- [1] The Economist, "The rights and wrongs of science fiction", (<http://www.economist.com/node/7040304>)
- [2] Sci Fi Film History, "<Home Page>", (<http://www.scifilmhistory.com/index.php>)
- [3] Sci Fi Film History, "Origins of science fiction", (<http://www.scifilmhistory.com/index.php?pageID=DefBack>)
- [4] Alfredo Suppia, "SF as Film Genre (1895-1960s)", (<http://virtual-sf.com/wp-content/uploads/2012/04/Suppia.pdf>)
- [5] Bradbury, Ray. *Fahrenheit 451*. New York: Simon & Schuster, 2012. Print.
- [6] Paul Croke (former newspaper editor, freelance writer, writes about consumer technology), "Science fiction predictions are surprisingly accurate", (<http://baltimorepostexaminer.com/science-fiction-predictions-surprisingly-accurate/2015/01/14>)

Chapter 3. Brief History of Medicine (throughout real-world history).

Medicine has a history ranging from the spiritual incantations and herbalist concoctions at the dawn of man into the diagnostic procedure and synthetically produced chemicals of the modern day. As scientific knowledge advanced through the ages, the manner in which man cares for one another and his or her proficiency in doing so has transformed dramatically.

Anthropologists attempt to hypothesize what medicine was like in humanity's prehistory. It was known that prehistoric peoples were very connected to the supernatural, although, these peoples were not without regard for the effects of the physical world. As Ancient History Encyclopedia points out: "It is clear that prehistoric societies believed in both natural and supernatural means of variably causing and treating disease." Medical News Today gives concurring indication, pointing out that there is evidence that prehistoric peoples knew about bone structure and the location of inner organs, lean tissue and fat tissue in the body. Yet at the time, there was no concept of public health, and common diseases included osteoarthritis, infections and complications, and rickets. In terms of medicine and surgery, "prehistoric medicine incorporated the use of plants, animal parts, and minerals". [2] These medications included yarrow, mallow, rosemary, and birch polypore. Medical practices and surgeries of the time include geophagy (eating soil-like or earth substances), and Trepanning (drilling a hole into the human skull). "According to cave paintings, anthropologists believe that [these practices and surgeries] were used in an attempt to cure people of mental disorders, migraines and epileptic seizures." [1a]

In regards to humanity's Ancient History, Medical News Today declares that Ancient Egypt from 3300 BCE to 525 BCE is "where we first see the dawn of what, today, we call 'medical care'." [1b] We also see the first physician in Ancient Egypt: Imhotep, who lived from 2667 BCE to 2648 BCE. While medical practice still included the supernatural, it also maintained a level of structure. Greek Historian

Herodotus indicates the early specialization of medicine: "the practice of medicine is so specialized among [physicians] that each physician is a healer of one disease and no more." [2] Writing allowed for documentation and continued learning through the sharing of ideas. One such idea was the Channel Theory. Egyptians prescribed to the Channel Theory, believing "as in irrigation, channels provided the body with routes for good health." [1b] Though not entirely anatomically accurate, it was not without some merit. Medical News Today says that it was a breakthrough in the history of medicine, allowing "medicine to move from entirely spiritual cures for diseases and disorders, towards practical ones." [1b] Suitably, Egyptian medicine was advanced for its time; doctors were even skilled at some rudimentary surgical procedures. In regards to public health, Egyptians were fairly clean and hygienic people, though this was due to religious reasons more so than knowledge of bacteria.

Ancient Greece yielded the greatest achievements in medicine in the Ancient World and "Ancient Greek medicine is probably the basis of modern scientific medicine." [1c] This era would see many external disciplines and great thinkers leave their marks on healthcare. Advanced mathematics brought numbers into the natural sciences, and thus into medicine. From Ancient Greece, Hippocrates of Kos (460BCE – 370BCE) would form his Hippocratic School of Medicine, revolutionizing medicine of the time, and fully separating it as a distinct discipline from philosophy.

Alongside his colleagues, Hippocrates wrote a collection of medical works known as the Hippocratic Corpus. His school was the first to use many of the medical terms still used today, such as: acute, chronic, and relapse. Believing matter to consist of the four basic elements (earth, water, air, and fire), "the ancient Greeks developed a humoral medicine system where treatment sought to restore the balance of (four) humours within the body." [2] The four humours were Blood, Phlegm, Yellow Bile, and Black Bile. Not knowing of its importance, public health was not a concern of political authority at the time, yet Medical News Today says that the Greeks "were great believers in staying healthy". [1]

Ancient Rome continued the level of expertise in medicine found in Greece, but did not achieve as much in the way of scientific progress. The Romans were

“more interested in prevention than cure.” [1d] We see the foundations of public health as Roman leaders recognize its importance in their soldiers’ well being. The Romans invented various surgical instruments, “including the first instruments unique to women, as well as the surgical uses of forceps, scalpels, cautery, cross-bladed scissors, the surgical needle, the sound, and speculas.” [2] Roman surgeons even sterilized their equipment in boiling water prior to using them. MNT says that “surgical procedures were performed using opium and scopolamine as painkillers, and acid vinegar (acetum) to clean up wounds.” [1d] The Ancient History Encyclopedia identifies that the Romans were able to perform cataract surgery. Though there was not a unified code of medical care, many doctors followed Greek practice in diagnosis, treatment, and prognosis. The Romans also used a wide range of herbal medicines. The Roman doctor Pedanius Dioscorides followed the Roman Legions gathering health-bringing plants and making observations on his findings. His text *De Materia Medica* served as a standard work of medical care until the Renaissance.

Ancient Rome was superior to its Greco counterpart in its public health principles. The Romans had public baths with high hygiene standards, and though temples were the center of healthcare in Greece, Rome had hospitals where doctors could observe and treat their patients.

There were many medical innovations occurring to the East. Though medicine is specialized today, “in the medieval Islamic world [medicine] was integrated with natural science, astrology, alchemy, religion, philosophy and mathematics.” [1e] At this time, Pediatrics was also separated as a distinct field by Muhammad ibn Zakariyā Rāzī (Al-Razī) (865-925), who came to be known as the Father of Pediatrics. A 5-volume medical encyclopedia “The Canon of Medicine” details many medical advancements of the 9th Century Middle East. Of these advancements include medicinal testing. These Medieval Islamic medications were plant based natural substances. Mercuric chloride and poppy were used to disinfect wounds and relieve pain, respectively. Some of the advancements in surgery include ophthalmologists being able to treat cataracts and trachoma, cauterization, and bloodletting.

Following the Fall of Rome, the feudal system of the Early Middle Ages (Dark Ages) left little in the way of public health systems, universities, or the spread of ideas via travel and trade. Larger towns that came from the development of the smaller fiefdoms carried many public health problems. Much of Greek and Roman medical knowledge was lost, and medical care suffered. In addition, the rise in the Catholic Church created conflict between the Church and medical practitioners. It became generally accepted that illness was punishment from God; penance and pilgrimage became the “cure” for ailment.

During the Crusades of the 12th century, many Christians traveled to the Middle East. There, many medical books and documents, including *The Canon of Medicine*, were translated to be shared with Western Europe. Yet, the theory of Humorism still persisted. According the Medical News Today, it was accepted that “All diseases and disorders [were] caused by too much or not enough of one of these humors.” [1f] Advanced, religious forms of herbalism were practiced. Monks followed the *Doctrine of Signature*, that maintained that “each substance had a signature which indicated how effective it might be. For example, some seeds that looked like miniature skulls, such as the skullcap, were used to treat headache.” [1f]

Twelfth century Europe saw the first medical schools. Hospitals also first originated in Medieval Europe, yet they more so resembled hospices, being use in care for the elderly and the poor. Though the sick could find respite there, attention was also reserved for “paupers, blind people, pilgrims, travelers, orphans, people with mental illness, and other destitute individuals.” [1f] Over time, the *hospitium* would become more like a hospital that resembles one today. At these newer hospitiums, monks provided proficient medical care. [1f] Medical News Today references Benjamin Lee Gordon (author of “Medieval Renaissance Medicine” (1959)): “the hospital as we know it today was invented by the French, but was originally set up to help plague victims, to separate lepers from the community, and later on to provide shelter for pilgrims.” [1f]

Despite the decline in medicine, surgery made many innovations. MNT concurs that “this long period of stagnation in medicine had one exception, historians say – “surgery”.” [1f] In Medieval Europe, it was reasoned that pus was

not a healthy affect of surgery. Yet it was still not known that lack of hygiene correlated with infection following surgery. However, the antiseptic effects of wine were discovered and in addition to fighting infection, surgeons were able to limit some of the pain their patients felt. Mandrake roots, opium, gall of boar, and hemlock were used as anesthetics. Interestingly, trepanning was still used to “let the demons out” of the heads of patients with neurological disorders. [1f]

The article notes that “as the Middle Ages gave way to the Renaissance, advances in medical practice accelerated dramatically.” [1f] It was first deduced that “epidemics may be caused by pathogens from outside the body”. [1f] As biology advanced, exceptionally illustrated and highly detailed books on human anatomy were published. Such include those by Andreas Vesalius (1514 – 1564), and co-authored by Leonardo Da Vinci (1452 – 1519) and Francesco Melzi. Da Vinci would do further work in biomechanics, having studied bone and muscle function and movement.

During the Renaissance we see the foundations of pharmacology, as the idea of using minerals and chemicals to aid the human body was first pioneered. In fact, the first botanical garden of medicinal plants was built in Padua, Italy in the 1530s. In the surgical scene, several instruments were invented by Ambroise Paré (1510 – 1590), and he discovered the effectiveness of turpentine in treating wounds. In addition, he “revived the method of ligature of the arteries during amputation, instead of cauterization.” [1f] He also considered phantom pains—experienced by amputees—to be occurring in the brain rather than the remains of the amputated limb.

Despite many advances, public health remained unpleasant during the Renaissance, as the Black Death would kill one-third of Europe’s population. Initially via the Mongol army catapulting infected corpses over the walls of Kaffa (the first example of biological warfare), the Plague would spread and cause “devastation in several areas [in Europe] right up to the 17th century.” [1f] At this time personal hygiene was at a low. Water was identified as a possible carrier of disease and the Church banned public bathing (partially due to questioning its morality).

Medical Diagnosis did not improve during the Renaissance. According to the article, physicians “did not really know what to do.” [1f] However, at the end of the era the world is presented with its first vaccination during the later Renaissance. Called the “Father of Immunology”, English doctor and scientist Edward Anthony Jenner created the first vaccination in his treatment of smallpox.

Developing sciences would lend their discoveries to advancing medicine in the 19th century. As stated by MNT, “Enormous developments were made in identifying and preventing illnesses. However, one problem still persisted, and that was treating and curing infectious diseases.” [1g] During the 19th century, there was a clear understanding of human anatomy. Though, in her article “Health & Medicine in the 19th Century”, Author Jan Marsh writes that “little was known about biochemistry or endocrinology.” [3] Nonetheless, disease transmission was understood to be a cause of genetics, lifestyle, and environment.

Methods of treatment took some time to develop. Marsh states that they “relied heavily on a ‘change of air’”. She also notes the utilization of bloodletting, a limited range of medication, and prayer. [3] Marsh notes that occupational injury and contact with toxic substances was the leading cause of death in males, while childbirth and violence were the leading causes of death for females. [3] Such high death rates were not necessarily in vain. In Britain, analysis of epidemic and mortality showed a “clear association of pollution and disease.” [3] Consequently, public health projects in the mid-19th century would work to provide clean water to mitigate the spread of cholera.

Scientific advancement would allow for medical progress. In Germany, physiology at a biochemical level was beginning to be understood. The germ theory of disease was beginning under the work of France’s Louis Pasteur. Modern biology was altering our understanding of human health. Many devices came to be invented in the 19th century such as the ophthalmoscope, enhanced microscopes, the kymograph, and the stethoscope.

Marsh comments that the advancement of surgery during this time period was largely owed to the invention of anaesthesia, that allowed for “more sophisticated operations”. [3] And antiseptic and aseptic surgical procedures

developed toward the end of the century would permit more progress in the years following.

In the final years of the 19th century, X-rays were discovered and with it came the beginnings of x-ray technology. Marsh remarks that the 19th century may have been more focused on prevention than healing, saying it is “notable more for systematic monitoring of disease aetiology than for curative treatment.” [3]

The medical industry itself grew in the 19th century. As renaissance hospitium developed into the modern hospital, there was an increase in hospital-based practice of medicine. Yet hospitals remained for the working class; the wealthy were treated in their homes. [3] Childbirth became a hospitalized matter. “Traditional female midwives were superseded by male obstetricians.” [3] Nursing rose in professional status under people like Florence Nightingale and became largely employed by women.

As the curative level did not match the preventative proficiency of 19th century, chemical pharmacology was not developed enough to fully treat all illness, and although better hygiene and nutrition could prevent ailment, many conditions remained chronic. This led to a rise in alternative therapies. Primitively enough, mental illness was still defined by the temperaments of humor theory (melancholic, choleric, etc.).

Mental health would slowly become its own distinct field. Psychiatry was initially used as a term to denote “medical treatment of disabling medical conditions.” [3] Yet it was not a pleasant start, as the Victorian era saw the rise of lunatic asylums for the mentally impaired. Such lunatic asylums were known for their cruel treatment of mental patients.

In the 20th century, medical knowledge accelerated dramatically. It was this exponential rise after centuries of gradual improvement that marks the beginning of what would truly be considered “Modern Medicine”. According to Phillip Rhodes of the Encyclopædia Britannica, this century “produced such a plethora of discoveries and advances that in some ways the face of medicine has changed out of all recognition.” [4] Furthermore, Rhodes contributes the progress to improvements in

communication in the scientific world. Even though professions were beginning to specialize more “teamwork became the norm”. [4]

There were numerous discoveries during the 1900s. So much so, that many developments were rendered obsolete by new advancements only a few years later. Different human blood types were discovered and lack of vitamins in the body were linked to being the cause of scurvy and rickets. The first laparoscopy was performed in 1910 and in 1921 Insulin was discovered. Advances in anesthesia lead to the practice of epidural anesthesia in surgery.

One of the most distinguished discoveries of the century was Penicillin in 1928. Moreover, “The discovery of Penicillin changed the course of history and saved hundreds of millions of lives.” [1g] In addition, electroencephalography was discovered in 1923 and the first dialysis machine was built in 1943. Later in the century, Cardiopulmonary resuscitation (CPR) was created. Techniques for DNA fingerprinting and DNA profiling were developed, as well as polymerase chain reaction (PCR) technology.

Transplant surgery would show many feats, as a human kidney, liver, lung, heart, and combined heart-lung transplant were all performed. In the study of viral infection, Vaccine medicine was used to treat numerous diseases. MNT confirms that “Vaccine for diphtheria, pertussis, tuberculosis, and tetanus were developed.” [1g] Additionally, the 20th century saw the creation of a vaccine for Yellow Fever, Polio, Measles, Rubella, and Hepatitis B.

Modern industry allowed for advanced medical technology. The first electrocardiogram was invented, as was medical Ultrasonography. An implantable pacemaker would control abnormal heart rhythms in patients, while in vitro fertilization would birth the first “test-tube baby”. Magnetic Resonance Imaging (MRI) and CT Scan (CAT Scan) allowed a deeper look into the human body. In 1972, the Insulin pump was invented and in 1973 Laser Eye Surgery was first performed.

The Modern Century saw much pharmacological advancement. The First beta blocker was invented treating heart disease and Valium was discovered treating anxiety, muscle spasms, and seizures. The creation of Prozac and SSRI’s was monumental in psychological pharmacology. According the MNT, “In 2010, 24 years

after fluoxetine's approval and nine years after it went off patent, it was the third most prescribed antidepressant in the USA (after sertraline and citalopram) - 24.4 million prescriptions were written that year." [1g]

The concept of chemotherapy was initiated alongside the development of a chemotherapeutic cure for sleeping sickness. Chemotherapeutic cure for *Streptococcus* was developed and Nitrogen mustard was discovered as the "first effective cancer chemotherapy drug." [1g]

Surgery at the time advanced on three fronts, anesthesia of pain, antisepsis/asepsis of infection, and management of shock, and surgeons began to specialize in particular subfields.

Many advancements are still occurring in present times, and the world of medicine continues in developing past innovations. In the past decade, The Human Genome Project draft was completed, allowing not only an understanding of the genetic makeup of human beings, but many other organisms as well. In regards to creation of synthetic organs and human tissue, the first bio-artificial liver was created. Utilizing rabbit liver cells, this "hybrid" organ can aid those with acute liver failure or those whose bodies have rejected an original transplant organ. In the realm of telemedicine, the first telesurgery operation on a gallbladder was conducted. In addition, the first partial and full face transplants were performed. Such a procedure could provide new hopeful lives to accident victims.

An HPV vaccine was created and in 2006, and the following year it was approved in 80 countries. And in the field of prosthetics, the first bionic eye was created, providing visual function to patients blind with retinitis pigmentosa.

Targeted Cancer Therapy has advanced cancer treatment. By focusing on specific tumor-causing molecules, healthy cells are not targeted by the treatment process. This limits damage to healthy human tissue, resulting in less ill side-effects than those seen in chemotherapy.

In public health, anti-smoking legislation has limited smoking rates and public exposure to second-hand smoke. By limiting smoking in public places, there has not only been a decrease in cigarette consumption, but "rates of preterm deliveries and small-for-date infants." [1g]

The articles expresses that in only 1996, “a 20-year-old AIDS patient...had an expected survival time of three to five years”. Due to combination drug therapy HIV survivability has dramatically increased. The highly active retroviral therapy known as HAART has increased the expected survival time to approximately 50 years. In addition to HIV/AIDS, such combination drug therapies have aided in the treatment of “cancer, heart disease, and other illnesses.” [1g]

Due to modern technological progress, there are many tools available to the modern doctor. Surgical lasers, robots, high-powered magnetic imagers, and networked data streams are all accessible to treat illness. The future may hold many possibilities, but advances in telemedicine may allow better remote care around the world and soon medicine itself may be specialized at a level that it is tailored to a patient’s individual genome. In the case of futurology, it’s important to know the real-world history in conjunction with extrapolating future possibilities. By seeing where history has taken medicinal knowledge and the professionals working to provide healthcare, one can better extrapolate what may come next. With such knowledge on what may come to pass in the field of medical scientific achievement and healthcare, we may be able to determine which future “worlds” present in science fiction film are plausible.

Chapter 3 Bibliography

- [1] Medical News Today; A History of Medicine
(<http://www.medicalnewstoday.com/info/medicine/>)
 - [1a] Medical News Today; What is Prehistoric Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/prehistoric-medicine.php>)
 - [1b] Medical News Today; What is Ancient Egyptian Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/ancient-egyptian-medicine.php>)
 - [1c] Medical News Today; What is Ancient Greek Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/ancient-greek-medicine.php>)

- [1d] Medical News Today; What is Ancient Roman Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/ancient-roman-medicine.php>)
- [1e] Medical News Today; What is Medieval Islamic Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/medieval-islamic-medicine.php>)
- [1f] Medical News Today; What is European Medieval & Renaissance Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/medieval-and-renaissance-medicine.php>)
- [1g] Medical News Today; What is Modern Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/modern-medicine.php>)
- [2] Ancient History Encyclopedia (<http://www.ancient.eu/medicine/>)
- [3] Jan Marsh (author of *The Pre-Raphaelite Sisterhood* (1985) and biographies of Dante Gabriel Rossetti and Christina Rossetti.); Health & Medicine in the 19th Century, (<http://www.vam.ac.uk/content/articles/h/health-and-medicine-in-the-19th-century/>)
- [4] Phillip Rhodes (Regional Postgraduate Dean of Medical Studies; Professor of Postgraduate Medical Education, University of Southampton, England, 1980–87. Author of *An Outline History of Medicine* and others.); History of Medicine, (<http://www.britannica.com/topic/history-of-medicine/Medicine-in-the-20th-century>)

Chapter 4. Role of the Physician (throughout real-world history).

Medical Knowledge has developed immensely throughout human history, with its chief profession—the Physician—cultivating its own reputation simultaneously. Studying the transformation of the profession up until modern day can help to better understand where the career might proceed in the future.

A doctor is a time-honored profession whose dedication to the health of his fellow man stands the test of time. However, the role took many strides to become that. Being a physician started as more of a skill rather than it's own profession. Time would turn it into one of the most well respected specialty careers of the modern day. As Author Ryan Winter states, "The profession has existed in one form or another for more than 25,000 years." [3] Cave paintings (in the region now known as France) show our first "healers" using plants for medicinal purposes. This first "medical knowledge"-base was passed on through tribes 27,000 years ago. [3]

As civilization dawned, in Ancient Egypt being a doctor "involved mastery of supernatural texts as well as later being trained in anatomy and diagnosis". Ancient Egypt, which advanced simple surgeries, brought the profession proficiency in surgical procedure. To the east in ancient Babylon, the early physicians had their own primeval system of prescription writing. The early physicians kept records of their prescriptions and their success and fail rates. We see in the early ancient world the doctor was in charge of many areas of the healthcare realm: medicine, surgery, and pharmacology.

Ancient Greece advanced medical progress tremendously and made a large leap in the profession of the physician. It was in this period that Medicine passed from religion into Academia; the Priest-Doctor became the Scholar-Doctor. Those aspiring to be physicians might study at the Hippocratic School of Medicine where they would be the first to take the Hippocratic Oath. In his book "The Physician Throughout the Ages", Arthur Selwyn-Brown, writes that Hippocrates placed high ethical standards upon the profession. The standards would mold the type of person

that would pursue such a profession. [5] Such ethics define the physician as a multi-faceted disciplinarian. Selwyn-Brown describes this philosophical "Renaissance Man" of sorts as "a chosen man, adapted by nature to aid the feeble and sick", who "must be a broad scholar" and "a gentleman in thought, action, word, demeanor, and appearance,". [5] Such a person is defined in the Hippocrates Corpus:

The doctor's mind must take heed and know how to be silent at the right time, and he must lead a well-ordered life, for that adds much to his good respute. His disposition should be that of a man of honor and he should always behave to all honorable men in a friendly and easy spirit. Precipitate actions and impetuosity are not liked, even though they may be useful. His bearing should show an expression of sympathy, and not anxiety nor vexation which would indicate presumption and misanthropy. He should not be afraid to laugh occasionally, and even be merry, but not so as to be a burden or a bore. He should remember that a physician is a gentleman and scholar like a divine. [5]

As early as the age of Ancient Greece, some physicians were also "public", being appointed and paid by the state. A doctor was a profession to be respected. Even medical students "all show plainly enough the superior refinement and culture of the class to which they belong." [5]

In the 9th Century Middle East, doctors began the practicing of medicine in hospitals. Selwyn-Brown notes the character of the 9th century Middle-Eastern doctor, such "doctors in Bagdad, Damascus, Harran, Baalbek, Aleppo, or Edessa were brilliant scholars and cultured gentleman." [5] Summarizing a story from Arabian Nights, Selwyn-Brown suggests that "[these stories indicate] the ability of the doctors of the age to cure their patients, and shows the high standing of the medical profession in various Arabian cities." [5]

Winter writes that “12th Century Italy saw the emergence of the first medical schools.” [3] Though medicine remained an academic pursuit, the early Middle Ages saw many Christian priests study as physicians. Doctors of the era began to separate in trade-skill from the apothecaries who created the medicines. Some doctors could not even “recognize their simple drugs.” [5]

The Medieval doctor still retained his reverence, defined by Selwyn-Brown as, “a strong, pulsating, active part of the community...receiving and giving service.” [5] Regardless of periods of peace or war, the “family doctor retained a heart of gold, and completed his ministering to the sick regardless of physical and political obstacles.” [5] Furthermore, the works of a doctor “are offsprings of self-sacrifice and altruism, and the doctor has always been among their ardent champions.” [5]

As medical knowledge developed and became a more specialized field, the roles of the medical practitioner became more specialized as well. According to MedlinePlus in the article “Doctor of medicine profession (MD)”, “At the beginning of the 17th century, medical practice in England was divided into three groups: the physicians, the surgeons, and the apothecaries.” [4] The author of “Health & Medicine in the 19th Century”, Jan Marsh, concurs and denotes the standing of each domain: “Like other learned professions, medicine grew in size and regulation. In the early Victorian era it was dominated by the gentlemen physicians of the Royal College (founded 1518), with surgeons and apothecaries occupying lower positions.” [2] The most elite, the physicians would hold a degree from a university. The hospital-trained surgeons learned their trade through apprenticeships. (They were often barbers too.) Apothecaries—who might be recognized as the original pharmacists—also learned their trade through apprenticeships. MedlinePlus notes that these distinct categories were not universal. As doctors arrived in colonial America from England, surgery and pharmacology were expected of them. The article points out the superiority of some doctors, noting that following the eventual loss of these class distinctions, the “snobbishness of physicians over surgeons quickly changed.” [4].

18th Century America would see the rise of medical societies. The New Jersey Medical Society was the first medical professional organization “developed [in

1766] to "form a program embracing all the matters of highest concern to the profession: regulation of practice; educational standards for apprentices; fee schedules; and a code of ethics." [4] The doctor would come to be regulated by these medical societies. Examination and licensing would be required to work as a physician. Such 19th century regulations would set high standards of practice on the physician, yet it also allowed the discernment of the medical professional from the imitating quack.

Doctors could train at society-affiliated "proprietary" medical colleges. These medical colleges would appeal to "a large number of students because they eliminated two features of university-affiliated medical schools: a long general education and a long lecture term." [4] Though standards were high for the physician, they were not uniform. With many medical societies, there was a need for similar levels of regulation. A national convention held in May 1846 proposed "A standard code of ethics for the profession, the adoption of uniform higher educational standards for MDs, including courses of premedical education, and the creation of a national medical association." [4]

Founded on May 5, 1847, the American Medical Association (AMA) set new educational standards for the profession. The original included:

- "A liberal education in the arts and sciences." [4]
- "A certificate of completion in an apprenticeship before entering the medical college." [4]
- "An MD degree that covered 3 years of study, including two 6-month lecture sessions, 3 months devoted to dissection, and a minimum of one 6-month session of hospital attendance." [4]

Further standards in 1852 would require that:

- "Medical schools had to provide a 16-week course of instruction that included anatomy, medicine, surgery, midwifery, and chemistry." [4]
- "Graduates had to be at least 21 years of age." [4]
- "Students had to complete a minimum of 3 years of study, 2 years of which were under an acceptable practitioner." [4]

In 1893, the John Hopkins University School of Medicine opened, redefining what it meant to be a medical school. Well-equipped with all the assets needed for medical education and research, as well as its own hospital department, is "served as a model for the reorganization of medical education. After this, many sub-standard medical schools closed." [4]

Medical students originally learned their trade in a hands-off approach, studying mainly from textbooks while in medical school. The first residency program for training doctors was established by Sir William Osler who MedlinePlus notes was the first to bring students to the patient's bedside. Prior to the 19th century, the pre-modern doctor did not specialize in individual fields. It was implied that specialization was unfair toward the general practitioner and publicly devalued his medical knowledge. Nevertheless, as scientific knowledge and medical techniques expanded, many doctors chose particular concentrations in which to focus. MedlinePlus states that conflict between "specialists and generalists continue, and have recently been fueled by issues related to modern health care reform." [4]

Such conflicts still occur among physicians in the medical world today. Like the eras of the past with their development of strong academic, philosophical roots, a professional class structure, and many education reforms, the contemporary world shapes the function and image of the physician. The Doctor will still remain a noble profession in the modern era, for it is founded on technology yet motivated by altruism combined with the need to self-actualize through service to others.

Chapter 4 Bibliography

- [1] Medical News Today; A History of Medicine
(<http://www.medicalnewstoday.com/info/medicine/>)
 - [1a] Medical News Today; What is Prehistoric Medicine,
(<http://www.medicalnewstoday.com/info/medicine/prehistoric-medicine.php>)
- [2] Jan Marsh (author of The Pre-Raphaelite Sisterhood (1985) and biographies of Dante Gabriel Rossetti and Christina Rossetti.); Health & Medicine in the 19th

Century, (<http://www.vam.ac.uk/content/articles/h/health-and-medicine-in-the-19th-century/>)

- [3] Ryan Winter (); The History of Physicians/Doctors, (<http://blog.soliant.com/careers-in-healthcare/the-history-of-physicians-doctors/>)
- [4] MedlinePlus; Doctor of medicine profession (MD), (<https://www.nlm.nih.gov/medlineplus/ency/article/001936.htm>)
- [5] Arthur Selwyn-Brown, "The Physician Throughout the Ages", [Book on a Website], (<http://babel.hathitrust.org/cgi/pt?id=uc1.31822005029525;view=1up;seq=7>)

Chapter 5. Medicine in Science Fiction.

All writers must create a setting to captivate their readers. However, science fiction is unique from other literary or film genres in that for many works a higher level of “worldbuilding” is required. As the characters in a science fiction film interact with the world around them, the audience sees some differences in the setting in which the narrative takes place. Many of those differences lead to major alterations in the setting. “If they have flying cars, do they need roads? What’s on the ground? If transportation is so quick do buildings need to be so tall, or be as centralized as the current city structure?” Thus, to suspend the disbelief of his or her audience, the author must then “build” a world.

Among things to be worldbuilt are the physical setting (transportation, city structure, medicine, technological advancements, food, music, weaponry), a social setting (human interaction, societal infrastructure, communication), and even a natural setting if we find the laws of physics are different in this universe. The presence of a well-defined medical world within a well-developed science fiction setting serves two purposes. First, it serves to better define the narrative taking place, thus presenting the audience with a better drama or story. Second, it can be a point of technological or societal speculation for the real world.

Advanced medicine and healthcare is common in science fiction film. Their presence speaks about how such advancements would affect medical care, and how they would serve the world in which they are a part. Three-dimensional printing of organic matter is something still experimental in modern times. Yet on the Earth of the *Fifth Element*, 3-D printing of organs and bodily tissues is all too common, as Supreme Being Leeloo has her entire body reconstructed from strands of her DNA. Such capacity would make for readily available body tissues. Organ donation would probably be unnecessary. Human life could be largely extended if one can have new body “pieces” when their old ones fail.

1997's *Gattaca* shows a world heavily invested in advancements in genomics. In a world where you can cherry-pick the best phenotype combinations for your offspring, physical malady is not the norm. In such a world, requiring healthcare is probably a sign of weakness, only reserved for the most rare and lethal of conditions and end-of-life care.

Eternal Sunshine of the Spotless Mind (2004) presents us with the surgical removal of memories. In a near future where "focused erasure of troubling memories" serves a sort of memory-wiping therapy, one is allowed to mitigate life problems in a similar ease to popping a Prozac. [1] In an article analyzing the science of the film, author Steven Johnson describes the offices of Lacuna Inc. as "low-rent plastic surgeon's offices". True, such an office is fitting in a world where memory erasure is as much a "cosmetic" procedure performed "on a whim". These procedures nearly play the role of an organic "reverse virtual reality". Ideas projected into the mind affect how one interacts with the real world, rather than vice versa. (Interestingly enough, in our world the opposite procedure may sooner exist, as cosmetic memory enhancement seems to be faster developing.)

In Ridley Scott's *Prometheus* (2012) the crew of the titular spaceship travels without a medical officer. Their ship contains medical pods capable of robot-performed surgery of any kind. In such a world, the human pathology is near-completely mapped to the point where diagnostic criteria can be quickly analyzed via computer questionnaire. Also present in the film is the android David who performs some elderly care for billionaire CEO Peter Weyland, yet this is not so much healthcare as acting in more of a servant role or even an extension of the "bodyservant" role.

Both *Star Wars* trilogies depict robots performing medical procedures on our heroes when they're wounded from their many adventures. There are almost no human doctors. And it would appear that, short of death, most injuries are inconsequential due to the ease of medical care available in the galaxy.

In *Robot and Frank* (2012), a robot provides end-of-life care for elderly Frank Weld. This may indeed show a future where family relations break down in an even busier world. Film Editor of Guardian News and Media Catherine Shoard affirms

that the film is relatable, being “a film for our times, set in the near future. It takes it as read that western society will farm out eldercare to any agency available, then shows how that might look” [2]. In addition, this infers that *Robot and Frank* reflects a future with a low fear of technology. This is opposite of the film norm. Film director Jake Schreier is quoted in Shoard’s article: “We already interact with things that have only the semblance of sentience. ‘I’m not stopping it, that’s for sure. There are too many examples of fear of the future in history that we have all just gotten over. It’s a question of just seeing what the effects are.’” [2]. Any “fear” of the robot is so nonexistent, that it becomes “part of the family”. In the world presented in *Robot & Frank* not only is over-digitization of data on the rise, exemplified in the town library’s modernization, the Robot stands as the first step in an over-digitization of people. The most considerable difference in the film’s world is that it reflects a future where robots stand-in for humans either in a general sense, or for specific people in one’s life. Though the Robot maybe serves some parental roles or, more specifically, in place of Frank’s son Hunter, it’s possible that the resulting interaction may not feel less human. Medical care may be the only vessel by which Artificial Intelligence feels remotely “human”. As editor and author Charlie Jane Anders states in an article “As Frank (and the audience) get used to the robot being around, we tend to humanize it more and more — but the robot doesn’t actually change or start seeming more human” [3]. *Robot & Frank* makes one question how dependence on robotics will alter what we define as humanity?

In an episode in the 60s and 70s series *The Jetsons*, Jane calls up their doctor via videophone when Elroy complains of feeling sick. This future, though animated, is rich with the prospects of telemedicine.

Cloud Atlas and *Star Trek* both present a “tricorder” device able to easily read body vitals and swiftly perform diagnoses. Similar to the stationary machines in *Prometheus* and *Elysium*, such machines show a medical world with a near-complete identified human pathology in which diagnosis is even more of a science and less of an art. The Emergency Medical Hologram Doctor aboard the *Voyager* functioned for remote medical monitoring and consultation. AMD Telemedicine asserts “The on-board construct served as a stand-in for a proper medical professional, enabling

crew members to consult an extensive medical database even from the farthest reaches of space" [4]. In addition to the machines used to completely cure the wealthy in *Elysium*, exosuits allowed protagonist Max Da Costa advanced physical capability. Such an exosuit is also seen in *Alien* in which Ripley battles the Xenomorph queen. Though her exosuit is far-removed from being for healthcare purposes, it nonetheless keeps her alive amidst hostile environments.

Iconic science fiction film *Blade Runner* (1982) presents a beautifully "built" world for its future. In a future Los Angeles featuring advanced biotechnology, having biorobotic android replicants means bio-engineered body parts are things of common trade (even as black market items). Not only is food able to be synthetically produced, we could imagine in a similar vein to *The Fifth Element*, organ and tissue availability is high in this world.

Other films present even more possibilities. *Brazil* (1985) exhibits a world of extended human life through advanced rejuvenating plastic surgery. The classic *Forbidden Planet* shows augmentation of human intelligence.

The advanced medical technology in science fiction serves as a component in the worlds in which they exist. Though not all science fiction universes are the same (in fact, each has its own distinct nuances) there are many common thematic dispositions among them that are generally accepted, if not 'expected'. Firstly, injuries are often not problematic. They can leave scarring on a character, but are rarely more than minimally crippling. This is due to not only the ease of medical care provided by tools such as robot doctors, quick-diagnosing tricorders, and synthetic organ production, but also to the near-immediacy of medical care. Many characters will often push the limits of near-death. How much closer to the grave can Leeloo get than to be fully rejuvenated from a scrap of DNA found in a glove of her vaporized remains?

We find that healthcare is still political in the world of science fiction. In discussing the utopian future of medicine, senior editor at motherboard Brian Merchant agrees that "building the perfect, life-preserving health care of the future is as much a political project as a technological one" [5]. One would think that the ease of medical care makes health care near universal in many science fiction

universes, yet works such as *Elysium* show a world containing violent conflict for universal health care, where the technologically-advanced treatments of the future are only available to the wealthy. Interestingly enough, as a literary device, science fiction medicine may even be more of a “magic”. It’s an easy-access, quick fix, with less disclosure on its actual mechanisms than other facets of science fiction. Thus “sci-fi medicine really does seem to resemble Arthur C. Clarke’s infamous adage that any sufficiently advanced technology is indistinguishable from magic.” [5].

Just as science fiction film has served as speculative fiction for widespread technology advancement, it’s as keen at making prediction of a more acute medical field. Mary Shelley’s *Frankenstein* (1818) creates an early vision of transplant surgery. A century later, such a procedure was realized. In his article “The Invasion of Modern Medicine by science fiction”, doctor Brad Aiken, MD gives further affirmation:

To what extent Shelley’s writing spurred the interest of future surgeons is unclear, but in 1905, the first successful tissue transplant surgery in a human being took place, and by the 1930’s, the first deceased-donor organ transplant was attempted (coincidentally?) just two years after the release of the movie *Frankenstein*, starring Boris Karloff [6].

Additional films exhibit more advanced transplants that would become realities in the years following. In *Face-Off* (1997), our protagonist undergoes an experimental face transplant. A real-life procedure was possible less than a decade after this movie’s release.

Star Trek features numerous surgical procedures, one of which is a brain transplant. Could this be achievable in the near future? Or are we closer to the many non-invasive surgeries present in the series? At the time of the show’s production, the modern radio therapeutic “Gamma Knife” and radiosurgical “Cyber Knife” were probably not even conceived ideas.

More iconic to science fiction film would be bionics technology. Aiken points out the 1970s *The Six Million Dollar Man*. Today the cochlear implant serves as a function bionic ear and prosthetic limbs are remarkably common, while current research is focusing on repairing the eyes through artificial retinas. Probably the most unforgettable science fiction bionic limb, Luke Skywalker's robotic arm works nearly identical to his original organic appendage. Though modern prosthetics do not function nearly as identical, "medical research is currently making the transition from prosthetics (passive artificial devices that replace a lost limb) to bionics (limbs that are controlled by the human brain)" [6].

Nanotechnology is a new, developing field in today's scientific world. The Borg nanities in *Star Trek* almost constitute their own level of Nanomedicine. Though still a new field, contemporary nanotechnology is currently in the stage of new drugs and drug delivery systems.

In the pharmacological spectrum, nothing comes as close to predicting the current use (or overuse) of psychological pharmaceuticals than Aldous Huxley's soma. This hallucinogenic drug in *Brave New World* has been likened to real-world anti-depressants.

Robot-performed medical procedures are customary in science fiction. AMD Telemedicine points to *Star Wars*:

When the movies were released, the idea of droids performing medical procedures on people directly was so far-fetched it could only exist in a science fiction context. Nowadays, however, the lines between fantasy and fact are blurring [7].

Robotic medical care in a science fiction world means an ease of access to medical care. Though possibly more impersonal, it provides a consistent alternative when no human physician is available. Today, we look to expand the reaches of limited medical resources. With telemedicine advancing, someday "just like 2-1B and FX-7 looked after Luke when no doctors were around on Hoth, these remote

telemedicine video conferencing units grant patients access to specialty medical care, regardless of when or where it's needed" [7].

Many different sub-areas of Telemedicine exist in science fiction that have come to realization in the real world. Doctors in *The Fifth Element* perform surgery remotely. Such a surgical process bears little resemblance to being "fictional" anymore, as AMD Telemedicine indicates, "BBC highlighted one Canadian doctor who has performed upward of 20 remote surgeries, sometimes from as far away as 250 miles" [4].

Remote consultation is more prevalent in science fiction film, an even becoming commonplace in the modern world. Through video conferencing and "encounter management software" doctors, nurses, and patients are being connected around the world.

Perhaps most notable in the prediction of modern Telemedicine occurred a century earlier, by writer Hugo Gernsback. Also, an inventor, editor, and magazine publisher, Gernsback was known for publishing various science fiction and invention articles and magazines, including *Modern Electronics* and *Electrical Experimenter* (later known as *Science and Invention*). In the article "Telemedicine Predicted in 1925", Matt Novak (author of Paleofuture blog), discusses Gernsback's conjectures. With the spread of the radio in the 1920s and inventions surrounding the earliest forms of television, communications technology was the existing advancing field of technology. Gernsback, always guessing what the future may hold, postulated the existence of a futuristic device he called the "teledactyl". Effectively predicting telemedicine, his device is simply a:

telautograph, translated into radio terms, with additional refinements. The doctor of the future, by means of this instrument, will be able to feel his patient, as it were, at a distance...The doctor manipulates his controls, which are then manipulated at the patient's room in exactly the same manner. The doctor sees what

is going on in the patient's room by means of a television screen." [8]

This device would allow a doctor to see the patient through a view screen, interact with them through robotic arms by which the doctor could "feel at a distance". While not directly related to healthcare, in his additional publications, Gernsback would make further predictions that exemplify technology's accurately depict the world of today:

As our civilization progresses we find it more and more necessary to act at a distance. Instead of visiting our friends, we now telephone them. Instead of going to a concert, we listen to it by radio. Soon, by means of television, we can stay right at home and view a theatrical performance, hearing and seeing it. This, however is far from sufficient. As we progress, we find our duties are multiplied and we have less and less to transport our physical bodies in order to transact business, to amuse ourselves, and so on." [8]

Telecdactyl-type technology is present in E.M. Forster's "The Machine Stops". In this narrative, medical care is still conducted via teleconference, yet additionally, the human patients are stationary in their cells like their stationary working doctors.

Just as humanity does not yet possess the power of faster-than-light travel or the luxury of flying cars (not to mention feasible sources of solar power), not all of science fiction healthcare is present in today's world. Modern technology has not fully caught up with the imaginations of the writers. A well-defined medical world within a developed work of science fiction can serve as a point of medical technological speculation. This speculation reflects what modern society 'wants' in future medical technology. Which according to Brian Merchant—who calls attention

to the simplicity of some science fiction technology—is a world where “a technowand instantly diagnoses your disease. A hospital bed-tube immediately puts your body back together. A super-vaccine cures what ails you”, or in general terms, “machines that program us into perfect health, pronto” [5].

Chapter 5 Bibliography

- [1] Steven Johnson (author), “The Science of Eternal Sunshine”, (http://www.slate.com/articles/arts/brave_new_world/2004/03/the_science_of_eternal_sunshine.html)
- [2] Catherin Shoard (film Editor, Guardian News and Media), “Robot & Frank: vision of the future?”, (<http://www.theguardian.com/film/2013/mar/08/robot-and-frank-vision-future>)
- [3] Charlie Jane Anders (Editor of io9 and author of *All the Birds in the Sky*), “*Robot and Frank*: science fiction at its Absolute Best”, (<http://io9.gizmodo.com/5936626/robot-and-frank-movie-science-fiction-at-its-absolute-best>)
- [4] AMD Telemedicine, “6 ways science fiction has predicted the future of telemedicine”, (<http://www.amdtelemedicine.com/blog/article/6-ways-science-fiction-has-predicted-future-telemedicine>)
- [5] Brian Merchant (Senior Editor at Motherboard), “Fixed in a Flash: The Utopian Future of Health Care, as Seen in science fiction”, (<http://motherboard.vice.com/read/the-utopian-future-of-medicine>)
- [6] Brad Aiken, MD (Medical Doctor), “The Invasion of Modern Medicine by science fiction or The Search for the Fountain of Youth”, (<http://www.bradaiken.com/SF-MedicineArticle.pdf>)
- [7] AMD Telemedicine, “Telemedicine inspiration from a galaxy far, far away”, (<http://www.amdtelemedicine.com/blog/article/telemedicine-inspiration-galaxy-far-far-away>)
- [8] Matt Novak (author of Paleofuture blog), “Telemedicine predicted in 1925”, (<http://www.smithsonianmag.com/ist/?next=/history/telemedicine-predicted-in-1925-124140942/>)

Chapter 6. The Doctor in science fiction: History of the Character.

The doctor character has an imperative place among the characters in a work of science fiction. According to Simon Carter, in his article "Doctors in Popular Fiction: 'He's dead, Jim' – medicine in science fiction #2", "the doctor within science fiction and fantasy is a key ingredient of the genre." [1] Yet, all characters and their interactions play a role in advancing the narrative.

This section will first identify common characters seen in science fiction film and literature, then explore the physician character in General Fiction. Following this, the physician character and its place among the other characters in science fiction film and literature will be indicated. Finally, the importance of this character will be identified, thus seeing how integral of a role it plays in the plot progression of SF narrative.

Across different works of general fiction, there are some characters that share similar roles within the development of the plot of their work. These characters are grouped into twelve common "Jungian Character Archetypes". [6] These categories define most of the important characters; "important" meaning that the character is involved in or has some effect on the resolution of the conflict. By exploring these archetypes we can identify which methods of characterization are present in science fiction.

"The Innocent" is a character archetype defined by its goal to be happy. He or she always attempts to do things right though may hold a generally naïve nature in doing so. "The Orphan" is the everyman. This down-to-Earth character holds the core desire to connect with others, maybe only because they relate so well with most due to their normalcy. "The Hero" wishes to improve their worth through their expert mastery. Always needing another test of skill, they fear being incompetent. "The Caregiver" protects and cares for other, though often at the price of their wellbeing, even to the point of martyrdom. "The Explorer" explores the world around them through adventure while at the same time taking a journey of self-

discovery. "The Rebel" breaks the rules, attempting to fix what "isn't working" within society. "The Lover" desires intimacy and experience with people, their work, and their surroundings. "The Creator" wishes to immortalize themselves in their creations. "The Jester" lives in the moment, brightening the world around them with their joy and humor. "The Sage" seeks the truth; using their intelligence to such levels can leave them stuck analyzing the details, leading to inaction. "The Magician" serves as a catalyst to change. They seek to understand the fundamental laws of the universe, though their actions may have unintended consequences for other characters. "The Ruler" desires control and exercises power to create a successful domain, yet their weakness lies in their inability to delegate. [6] They may find themselves unable to "see the forest for the trees".

These common fictional character archetypes are equally present in science fiction film. There seems to be little partiality in the utilization of such archetypes over the others, except in that "The Lover" and "The Jester" will only be less present when romance or comedy, respectively, are less of a feature in the film. Depending upon the narrative being told, the main characters could be any of the above. With the protagonists as "innocents", "orphans", "heroes", the deuteragonists as "caregivers" or "jesters" or "sages", and the villains as "rebels", "magicians", or "rulers". These are just examples though, as the characters present in any narrative is not bound to those archetypes.

Often science fiction will not follow advanced characterization or specialized, over-dynamic characters that jump between archetypes. Such extensive character portrayal may appear in a non-science fiction work. However, science fiction works, that include other specialized story elements (e.g. unique setting, different cultural-social interaction, etc.) might overwhelm the audience if too much dynamism is offered altogether by introducing too complex forms of characterization. If such a risk in characterization was taken, it might provide the viewer with too much "difference"—the world is already "different" enough. Despite advanced themes, more basic character arcs may be followed. An exception might be with science fiction set in our universe. There is more "room" for advanced character arcs due to the more "close-to-home" setting.

The physician character is present as a character in general fiction whose characterization varies between works. We see him as the Doctor-Hero, maybe one of the earliest in modern cinema. Akin to someone such as Dr. Kildare, a doctor-hero operates in a small town (or a small community within a larger living area) where their knowledge is something to be respected. They are portrayed as the “good guy”. Other examples include Dr. Abraham Van Helsing, and Dr. Stephen Maturin. Reminiscent of the 1950s-esque view of medicine, our doctor might find him or herself leading others in the narrative who respect him for his medical capabilities.

Probably more commonly seen in general fiction is the Mad Scientist. Often times amid their unnerving experiments we forget that the likes of Dr. Frankenstein, Dr. Henry Jekyll, and Dr. Moreau, have medical knowledge and hold medical doctorates.

The physician may be characterized as “the Watson” if they are a knowledgeable secondary character, who is not the conclusion-drawer.

Truly evil physicians may be depicted as villains. Dr. Fu-Manchu, Dr. Hannibal Lecter, and Dr. Julius No, are some examples.

General fiction has found the doctors take on roles reflective of the real world. Dr. Christian Szell operates as an almost “Dr. Mengele-type”/Nazi Doctor. A physician character may also enable their patients’ drug habits as a Dr. Feelgood, or be a conversely unsympathetic doctor lacking emotional empathy and expressing only a superiority complex as a “Dr. Jerk”.

Of the twelve main archetypes, the doctor is not necessarily defined to any solely due to being a “healer”. He is more defined to the archetypes on account of his placement as a supporting character or his intellectual attributes. Thus, we might be more likely to see the physician as a “Mentor” using his wisdom to guide the main character, a “Magician” exploring the reaches of medical science with his advanced skill, a “Caregiver” using his medical knowledge to provide healing of the mind and soul of others alongside treatment of the body. In the occurrence that our doctor is the hero of the narrative, they may fit the “Hero” archetype. (It is important to note that the main character does not necessarily need to be the “Hero” archetype. It’s probably just as often that the main character is the “Innocent” or the “Orphan”.)

Author Colonel Bell Burr writes thoroughly about the physician in fiction in his book "The Physician as a Character in Fiction". He agrees that the physician is not often the leading character. In regards to the specialization of medical practice, he remarks that "...and though the specialist, particularly the surgeon has had a measure of appreciation, it is the family physician to whom the highest meed of praise has been accorded." [7] It is true, that fiction narrative may find the general practitioner more appreciated by the other characters than the specialist. Often works with a general practitioner are reflective of a 1950s admiration toward the feeling of medicine. Also, a general practitioner is more likely to be a doctor-hero than not.

Within science fiction, the physician—like any other character—has his place among the other characters. Exploring the ways in which physician characters interact with the other characters of the film will allow us to better understand the significance of the character in science fiction. From there we can better determine the general trends of the character.

The physician may act as the confidante to other characters. This would seem customary of a physician character and not only because of their profession. As a supporting character who may act as a caregiver to a more central character, the central character may disclose information to the physician that reveals the personality of the central character to the audience, or helps develop the personality of the central character.

Some physician characters may appear as a "Flat" character, yet upon more narrative progression, we get to see their complexity. They are often hidden to be more "Round" than expected. On the spectrum of dynamic-static characterization, this character is more static than others, yet over the course of a film we see character development as their "roundness" as a character is revealed to the viewer. An example of this would be Dr. Lamar in *Gattaca*, who initially appears to be a character seamlessly woven into the background of the genetic verification laboratory. Throughout the film we see his capabilities and personality flaws as a doctor. By the end of the film we fully recognize his complexity as a character, as it is revealed to the audience that Dr. Lamar has known all along about the protagonist's

genetic false identity, but does not turn him in to the authorities, as Dr. Lamar has a son who is also genetically "inferior" and both admire the protagonist's triumph.

Accordingly, the physician is often presented via indirect characterization. According to learnlexicon.net,

This refers to what the *character* says or does. The reader then **infers** what the character is all about. This mimics how we understand people in the real world, since we can't "get inside their heads". In other words, in an indirect characterization, it's **the reader** who is obliged to figure out what the character is like. And sometimes the reader will get it wrong. [5]

The physician is often revealed as a character via psychological description, the characters actions, or by another character's reaction to them (maybe their reputation).

The physician is rarely a stock character, unless they are seen more of as a technician or "part" of the background. In this case, it only adds verisimilitude to the film, but that's only because they're less of a character and more of a piece of "stage furniture".

The physician is often a sympathetic character. Defined by James Patrick Kelly as:

One whose motivations readers can understand and whose feelings they can comfortably share. This is the kind of character of whom naive readers will say "I could identify with her." [4]

Though a secondary character, maybe even the deuteragonist, the physician is often not the viewpoint character (assuming the viewpoint character is not the

protagonist). Except in directly medical related works (often those are not science fiction, however).

In terms of general character archetypes, the physician may just as likely be the same as in general fiction: "Mentor", "Magician", "Caregiver", and possibly "Hero". Though they are not necessarily bound to those four and may in fact take up the other archetypes the more central they are to the plot of a science fiction film—especially in more modern science films where a medical career is seen of as possessing less of status and intellectual reverence and more as a typical professional occupation.

The physician character has major significance in a science fiction film, holding a role that's integral in the plot progression of the SF narrative. The physician, through his work in the film, may reflect how the medical profession is viewed during the era of the film's production. The physician may show a reflection of what contemporary health threats and diseases were viewed by the audiences of the time, [2] although this is probably typical of any character-profession of any genre (even general fiction). According to Carter, "these representations can give us insights into contemporary concerns about how medicine is performed." [1]

Through frequent characterized as a sympathetic character, it allows a point of relation to the audience. In a world that is far-removed from our own in technology and setting, it allows for some "grounding" in that the audience can stay connected to the science fiction world while maintaining something with which they can relate back to the real world. In his book "Using Medicine in science fiction: The SF Writer's Guide to Human Biology", author H. G. Stratmann notes the importance of "grounding": "However, a work of *science* fiction should be expected to have some grounding in actual medical science..." [3] The doctor character's grounding, used as a relation of science fiction to the real world, in turn relates science fiction science to actual medical science.

It is clear that the physician character has a history of use not only in science fiction, but in general fiction as well. By identifying the presence of the physician among the typical characters of a science fiction film, we can see how they affect the story, the other characters, and how we—the viewers—view the film. By analyzing

the importance of the physician, we are able to better see the trends associated with the figure throughout the genre of science fiction, and what these trends mean in terms of the real-world view of medicine at the time of a film's production and the real-world view of our medical profession's speculated future existence.

Chapter 6 Bibliography

- [1] Simon Carter, "Doctors in Popular Fiction: 'He's dead, Jim' – medicine in science fiction #2", (<http://guerillawire.org/politics/doctors-in-popular-fiction-hes-dead-jim-medicine-in-science-fiction-2/>)
- [2] Brett S. Stifflemire, "Physicians, Society, and the science fiction Genre in the Film Versions of Invasion of the Body Snatchers: or Doctors with a Serious Pod Complex", (<http://scholarsarchive.byu.edu/cgi/viewcontent.cgi?article=3267&context=etd>)
- [3] Stratmann, H. G. *Using Medicine in science fiction: The SF Writer's Guide to Human Biology*. Cham: Springer, 2016. Print.
- [4] ([Adapted from "You and Your Characters" by James Patrick Kelly: <http://www.sfw.org/writing/character.htm>]), "English 250 Fiction Unit: Characterization 1 – Character Types" (<http://www.ohio.edu/people/hartleyg/ref/fiction/character1.html>)
- [5] learn.lexiconic.net, "Types of Characters in Fiction", (<http://learn.lexiconic.net/characters.htm>)
- [6] J.J. Jonas, "The Twelve Archetypes", (http://www.uilutexas.org/files/capitalconference/Twelve_Character_Archetypes.pdf)
- [7] Colonel Bell Burr, "The Physician as a Character in Fiction", (https://books.google.com/books?id=6gziAAAAMAAJ&pg=PA2&lpg=PA2&dq=physician+character+in+fiction&source=bl&ots=anvC_TKWIs&sig=9ZC65ykcCdmqNx0jzBAZxQII4V0&hl=en&sa=X&ved=0ahUKEwjM5OrelYjMAhUI4yYKHd60BGcQ6AEIezAH#v=onepage&q=physician%20character%20in%20fiction&f=false)

Chapter 7. The Doctor in science fiction: Trends seen in the genre.

The physician character is a typical role in works of fiction. Moreover, this character serves an important role in science fiction. As with any commonly utilized variety of character, there will exist trends within the genre across different works of fiction. This section will view those commonalities found between physicians in science fiction film and literature. It will then point out "Character-Typings". These are cliché-bordering tendencies found in the traits of physicians undergoing similar plots. Finally, the most common archetypes found in science fiction film will be presented. These archetypes show the major inclinations for physicians in science fiction film and literature. For the purpose of identifying the tropes in this section, examples from non-science fiction sources will be utilized if they present a clearer illustration. They should pertain as they are doctor-traits nonetheless. In this section *Using Medicine in science fiction: The SF Writer's Guide to Human Biology* by H. G. Stratmann was referenced on multiple instances for his comparison of science fiction medical science and care to real world medical science and care.

Many general commonalities exist between characters in science fiction that are physicians. The doctor is often (but not always) a supporting character. This is truer in earlier science fiction works than in later ones. Physicians like Dr. McCoy, Dr. Simon Tam, and Dr. Cottle are all important aboard their starships, but rarely are they the captain. There are a few exceptions to this commonality, earlier sci-fi that crosses over into the horror genre will, however (Dr. Frankenstein, Dr. Jekyll). Also, Science fiction that has a strong medical aspect may feature the doctor as the main character.

Stratmann notes that in the far future, the physician is not bound to humanity. The doctor need not be human nor necessarily treat only humans. The doctor frequently can treat extraterrestrials. It even applies that extraterrestrial doctors are often found to hold licenses in the treatment of humans. Though, the difficulty in treatment of another species may repeatedly go overlooked; the doctor

treating another life form rarely loses any grounding that was established via their compassion as a healer.

Much science fiction has been known to replace their physician characters with technology. Maybe in a robot-populated future, an android practicing as your GP is no anomaly. Such is the case with the “medical apparatus” in “The Machine Stops”. In a future with complete record of every possible diagnosis and treatment, a machine that can simply cure you without human operation should not seem outlandish.

Stratmann makes note of some physicians who are “grossly misguided” or “simply evil” in nature. Such physicians are more of a character type of “Mad Scientist” existing closer to the sci-fi-horror-subgenre spectrum.

The physician character is not perfect in their nature. Like any other primary character they possess their own unique flaws. This is peculiarly not the case when it comes to their practice of medicine. Stratmann identifies that within “their roles as physicians they are often portrayed essentially as wizards, able to deal with any plot-required medical challenge incredibly quickly if not always easily.” [2]

It’s possible their excellence in performance is exacerbated due to the fact that they often succeed despite limited resources. A voyaging starship may only carry so many medical supplies, and—as the laws of theatre would have it—nothing adds to the drama of a scene than the shortage of aforementioned limited supplies. Nevertheless, our physician possesses the skills and resourcefulness to prosper. In this way, the trekking doctor differs from his at-home counterpart who works with near-unlimited medical resources and equipment.

Stratmann identifies another commonality of the medical doctor is his or her inclination to “pull the sheet” over a character quickly. Quicker, he remarks, than is standard procedure in today’s world. While this could be simply a style of film, it could also be a depiction of the fact-oriented mindedness associated with our science fiction physicians.

Though none aboard *Serenity* outrank Captain Reynolds, there is one who outranks Captain Reynolds’s health: Dr. Simon Tam. The doctor in science fiction is often able to apply his power of “Doctor’s Orders”, often overriding those of higher

rank or status than themselves when it comes to safeguarding the health of their superior.

It's common for the physician to serve as a link to the audience. Through their interpersonal empathy or their similarity to physicians of the real world, they can serve as a "grounding" point in a work of science fiction. When referring to the medicine being practiced, Stratmann states that "a work of *science* fiction should be expected to have some grounding in actual medical science..." [2] and by serving as a relation of science fiction to the real world, the doctor character can bridge science fiction science to actual medical science.

There may exist a degree of "M.D. Envy" in science fiction film. [6] This envy is due to the admirability of the physician profession and is often maintained by other health professionals who are not doctors (e.g. dentists, chiropractors, nurses, even general practitioners when compared to specialists, and doctors of alternative medicine (the more "hokum", the more the envy)). The more technically specialized modern nurse may be exempt from being so begrudging, until they are denoted as "just a nurse". We see a reflection of this envy through M.D. superiority in *Star Trek IV: The Voyage Home*, when a modern MD questions 23rd-century Dr. McCoy "What's your degree in? Dentistry?" It's important to note that this trait is not exclusive to science fiction film. A captive Dr. Hannibal Lecter in *Silence of the Lambs* faces the constant envy of his captor Dr. Chilton, who is actually, not a "real" medical doctor. [6]

Following the commonalities in traits seen in doctor characters in science fiction are more encompassing typical personalities. These cliché-bordering "character-typings" reveal deeper patterns in the science fiction physician and allow a closer look into how the audience views our healthcare specialists in the future. How a character-typing employs their medical care is often the determining factor in a positive or negative outlook; many common healthcare practices today were once feared when they were just new, unknown technologies. Because many of these types are distinctive of physician characters, it's normal that some of the traits of the types apply to physician characters in general fiction as well.

The first—and probably earliest—seen character-typing is the Mad Scientist. This sinister, passion-fueled, yet-highly skilled machinist works on wicked experiments of their dark imagination. Though not often employed at a private practice concurrently, they frequently exhibit exceptional medical skills, and are thus, still to be considered physicians. Notable Mad Scientists include Dr. Frankenstein, Dr. Henry Jekyll, and Dr. Moreau.

A second common character is the Evil Villain. Whether it from a James Bond film (bordering sci-fi and high-tech spy genre) or from a classic Space Opera, these villains technically hold their medical degree (though we can't be certain on how they've kept their Hippocratic Oath). These "Evil Villains" often demonstrate a Renaissance Man range of knowledge, skilled in many fields and philosophies, akin to the physician-scholars of our own world in the eras of Ancient Greece and Renaissance Europe.

A less-utilized type would be a Dr. Feelgood. Present in the real world before advanced prescription tracking, this physician serves as an "enabler" of sorts, supporting "another character's dangerous [and/]or unethical prescription drug habit" though "sometimes an otherwise respectable doctor." [3]

A character who might be called a "Medic" would not be too different from a regular physician character. However, they are denoted a "medic" because they often exist in a science fiction plot that has an element of action present. Usually, a trained physician or an EMT, they are also less "personable than rational." [4] The literary forum database tvtropes.org gives a description of this trope. The website states that it is highly possible that despite the action narrative of the science fiction film, the "Medic" character may be more of a pacifist. Though they may defend themselves or their patients when necessary. (This is actually relatable to real life where medical personnel are non-combatants under the Laws and Customs of War.) Dr. Simon Tam (*Firefly*, *Serenity*) and Primrose Everdeen (*The Hunger Games*) are examples of this trope.

All patients wish their doctors to be capable of empathizing emotionally with them. Though, some doctors have little compassion, despite being a doctor. These narcissistic "Dr. Jerks" (as defined by tvtropes.org) are a stark opposite to a more

common interpretation of a doctor. [5] Though some may truly care about the livelihoods of their patients, others seem to simply want to express their superiority through their work. Professor Nemur (*Flowers for Algernon*), Dr. James "Mossy" Lawn (*Discworld*), and Dr. Pulaski, (*Star Trek: The Next Generation*) are all examples of "Dr. Jerks". This character-typing seems to have become very popular in modern non-science fiction television. The classic example would be Dr. Gregory House (*House*).

Amidst epidemics that threaten a science fiction world, a physician resembling a Renaissance plague doctor may be present. Reminiscent in action (and maybe costume) this doctor works tirelessly against an epidemic though may in fact be inadvertently contributing to its exacerbation. If this physician is an evil character, he or she can be found to knowingly be the spreader of the disease.

There are a few overarching themes into which most physician characters can be channeled. These major archetypes found in science fiction film show the general inclinations for physicians in science fiction. In research, three major archetypes have been discovered. The archetypes may even almost show a development of the character over time. As noted by author Simon Carter in his article "Doctors in Popular Fiction: 'He's dead, Jim' – medicine in science fiction #2", the representations of the physician character "can give us insights into contemporary concerns about how medicine is performed." [1]

The first archetype is the doctor who is representative of the film's production era, but utilizes futuristic equipment. This doctor reflects the current real-world view of medicine. This may be the typical archetype of any film-portrayed profession. Nevertheless, this archetype shows how the writer may view a doctor is "supposed" to act.

The second archetype is the doctor who has returned to mysticism. Often found in post-apocalyptic science fiction, this doctor's once-technological medical-science has become viewed by the science fiction's society as an old world mysticism of sorts. This doctor may be suggestive of a real-world ancient Greek Scholar-Doctor, or a European Renaissance Physician-Philosopher.

The third archetype is the doctor who has turned into a technician. In this science fiction world, medicine and healthcare have been defined to a diagnostic-

treatment-prognosis algorithm. The physician has lost his need for a human-side and simply “operates” the medical machinery. In a world advanced enough, the physician may not be present; there may only be machinery.

Such archetypes help define the work of science fiction, the future speculation, and any contemporary social commentary on the part of the writers. These major archetypes will be delved further into in the following sections. The more specific character-typings and more minute commonalities are sub-facets to these archetypes and serve as smaller representations of real world concerns of medicine, as well as characteristics that better appropriate the physician character into a work of science fiction film.

Chapter 7 Bibliography

- [1] Simon Carter, “Doctors in Popular Fiction: ‘He’s dead, Jim’ – medicine in science fiction #2”, (<http://guerillawire.org/politics/doctors-in-popular-fiction-hes-dead-jim-medicine-in-science-fiction-2/>)
- [2] Stratmann, H. G. *Using Medicine in science fiction: The SF Writer’s Guide to Human Biology*. Cham: Springer, 2016. Print.
- [3] tvtropes.org, “Dr. Feelgood”, (<http://tvtropes.org/pmwiki/pmwiki.php/Main/DrFeelgood>)
- [4] tvtropes.org, “The Medic”, (<http://tvtropes.org/pmwiki/pmwiki.php/Main/TheMedic>)
- [5] tvtropes.org, “Dr. Jerk”, (<http://tvtropes.org/pmwiki/pmwiki.php/Main/DrJerk>)
- [6] tvtropes.org. “M.D. Envy”, (<http://tvtropes.org/pmwiki/pmwiki.php/Main/MdEnvy>)

Chapter 8. The Doctor in science fiction: Archetype 1: *Same-era doctor, new equipment.*

The three major archetypes in science fiction film define three major categories in which most commonly a typical science fiction physician character will be depicted. The first major archetype is the most common, and is seen in the earliest science fiction films, as well as most science fiction films today. This archetype is known as the *Same-era doctor with new equipment*. In this section we will describe this archetype in full, and relate it to general science fiction doctors in science fiction as well as to physicians in fiction in general. Any common subgenres in which this doctor is present will be described. I will also touch on why this archetype is so prevalent in science fiction film. Examples of characters that embody this archetype will be listed. In addition, I will evaluate the probability of such doctors existing in the world in which they are written. Finally, I will evaluate the plausibility of this future doctor existing in the future of real-world humanity's doctor profession.

The Archetype 1 *Same-era doctor with new equipment* is what one is most prone to think of when they think "Typical science fiction doctor". This at first sounds odd, because they are all so different. Yet they are only different because the Archetype 1 doctor is a "contemporary doctor" at the time of a film's publication. This physician character is a seemingly modern doctor superimposed in a science fiction setting.

This doctor may be found dressing typical of his or her world, but more often than not carries some vestment of their attire that is suggestive that medicine is their trade. They do utilize high-tech equipment—that may be the only thing "futuristic" about them. Some of their equipment is high-tech versions of medical equipment we have today (i.e. a full vital reader (tricorder) as opposed to a simple head thermometer).

This doctor is not restricted to professional specialization—only as far as the modern doctor of the day can be specialized. Indeed, we see many general practitioners among Archetype 1 doctors. Their rapport with patients is similar to that of real-world doctors. As such, they are likely compassionate characters, often siding with the “good guys” of the story. These *Same-era doctors* are generally older in age, at least above 40. (Even among the “young-ified” characters of the newest installment in the *Star Trek* franchise, McCoy, though probably only in his 30s, is still the oldest of the crew.)

As these doctors are representative of real world modern doctors, of the three archetypes they are likely to be the most similar to general fiction doctors. Of the Jungian archetypes that a general fiction doctor is depicted as, Archetype 1 doctors are often Mentors or Caregivers. If they are the main character (most often if the episode in their TV series is presenting a story centered around them), they could be the Hero for short durations. Lastly, this Archetype 1 doctor commonly will act as the confidante to other characters. When doing such, they take on the Sage Jungian Archetype.

This doctor is also most likely to embody the general trends seen in science fiction physicians more so than they are just general fiction physicians. Like many sci-fi doctors, Archetype 1 doctors are often supporting characters. They also don't necessarily need be human. In fact, even the most alien of Archetype 1 doctors will act very humanlike in demeanor. As well, most Archetype 1 doctors can treat extraterrestrials. And if they can, it's never a partial certainty. It's “all-or-nothing” when it comes to this medical proficiency.

These doctors are usually the ones to end up having to make use of limited resources. This will occur alongside setting placement, as Dr. Cottle on the planned-to-be-decommissioned Battlestar Galactic has less resources at hand than Dr. Simon Tam when practicing trauma surgery in Capital City. In action, the *Same-era doctor* is most likely to “pull the sheet” on a recently deceased patient or enact “Doctor's Orders” on a superior. Bones often overrides Kirk when the Captain's health is at stake. These are the doctors that will incite M.D. envy from others, as the mirrored

profession still carries the same weight in the future. This is especially true in older science fiction films.

Due to the nature of this archetype, they often are most likely to be the audience link and a grounding character. This typically makes them a sympathetic character with the audience. And between the character-typings of the general fiction and general science fiction doctors, the Archetype 1 doctor can also be found as a Mad Scientist, "The Medic", The Doctor-Hero, or even "The Watson". [10]

The *Same-era doctor (with new equipment)*, will be common across all genres, as they serve as the "stock" archetype for doctors. There are however subgenres where they are likely not to be present. There are most likely not in alternative universe science fiction. The Suk doctors on *Dune*, or the Asgardian medical care of *Thor* will not resemble Dr. Kildare. These doctors also do not make common presence in post-apocalyptic science fiction. However, they are often the only physician character that will be depicted in horror sci-fi (though they are by no means exclusive to this genre.) This is also true with special agent science fiction and superhero film (sans Dr. Strange).

There are a few theories on why this archetype is so prevalent. While it is possible that it may provide a point for medical social commentary, more likely is the "grounding" that this character allows for the audience. In a science fiction world consisting of many technological and cultural changes, a viewer will often need a feature of the film in which they can relate. It's most fitting that the sympathetic character will provide this "helping hand" to the lost viewer: A compassionate 50s general practitioner who's bedside manner with other characters will rollover into the audience.

Another example of grounding is in what a viewer cares about when watching a science fiction film. They want to see space battles, not an appendectomy. Keeping medicine the same, allows undivided focus on flashier features. This archetype of doctor is so prevalent, because of—as Merchant puts it—"our eagerness to get beyond the body and into the more escapist elements of our fictions." [3]

Despite grounding and relatability, the medicine depicted may not be “expected” to be assumed understood by the audience. Science fiction films exhibiting Archetype 1 doctors are just as willing to “worldbuild” how the medicine is performed, showing the audience new and exciting technologies.

One of the most notable examples of the Archetype 1 doctor is Dr. Leonard McCoy from *Star Trek: The Original Series*. Dr. McCoy is the outstanding old-fashioned “country doctor”. As writer Simon Carter puts it, “[He is] an idealized General Practitioner with a broad skill range, willing to carry out any procedure and comfortable with advanced technology.” [1] Yet, our Dr. McCoy is more than just a GP with fancy tools, he is multi-skilled, “an accomplished surgeon, physician, psychologist, and exobiologist, and was also considered an expert in space psychology.” [5] (Though this is probably due to the functionality of a show that can’t make another specialist every time need be.)

Though not in dress, he acts very much like a 60s general practitioner, fitting with his wide-range of medical knowledge. His tools (tricorder, etc.) are of a future age, yet he utilizes them as a 60s GP would use any new equipment he acquired. Most iconic to his “past-incarnation”, he carries that 60s physician intellectual/professional-bravado. Such an attitude makes him a Hero-doctor often within the series.

He is known to feud with the rationale-minded Vulcan Mr. Spock. McCoy, being the “ever emotional and passionate” member of the protagonist-triumvirate, becomes the sympathetic character to the audience on multiple occasions. [5] Though, according to Carter, “While easily annoyed, he also had a friendly bedside manner” and often served as the “moral centre of the original series...” [1] According to his article, we rarely see McCoy in politically controversial decisions where we might question how we feel about him.

Another prime example of an Archetype 1 doctor is Dr. Miles Bennell from *Invasion of the Body Snatchers (1956)*. Though we first see him in a hospital setting, Bennell is a small-town General Practitioner. Or as Stifflemire cites author Robert Block to describe doctors like Dr. Bennell: “balding, horn-rimmed-wearing general practitioners.” [2] Stifflemire states the Dr. Bennell is depicted like other doctors in

50s films, who are “highly esteemed members of their communities and are accepted as knowledgeable, altruistic healers.”

Being the main character of his film, Dr. Bennell is also a classic “Doctor-Hero”, more so than even Dr. McCoy (but only due to his being the central protagonist). Bennell cares more for caring for his fellow man than even the scientific aspect of medicine. In terms of fictional archetypes, he is the “Hero” as well as the “Caregiver”.

A more recent example of our Archetype 1 doctor is Dr. Sherman Cottle from the 2004-2009 *Battlestar Galactica*. Serving as the Chief Medical Officer of the Battlestar Galactica, Dr. Cottle is skilled as both a physician and a surgeon. A morally ambiguous man, this leads to his frequent neutrality in conflicts. Though that does not keep him from aiding people personally. He serves the role of confidante for President Roslin in keeping her cancer a secret from the other characters.

He dresses as a typical 80s medical doctor. If viewing the show without knowledge of what one was watching, and individual might think they were watching a medical drama even. Though his tools may be advanced (even though *Battlestar Galactica's* technology is retro-looking by design), he uses them as in contemporary manner, while still possessing the very old-world type equipment (e.g. stethoscope.) His “old-timey” attitude is shown in his resignation to more contemporary preventative medicine, as he is “maybe the last human doctor and one who also smoked while tending his patients” [1] despite the obvious medical risks. He fits the character typing of a “Dr. Jerk” and possesses an “outwardly abrasive demeanor, and being unimpressed by positions of authority.” [4] (Meaning he’s more than likely to apply “Doctor’s Orders on authority.”)

Throughout his development on the show, Dr. Cottle shows some flat to round progression. His caring side is hidden, but he truly only cares for treating people’s medical ailments. He remains neutral over much else. Tvtropes.org gives a general description: “Doc Cottle from *Battlestar Galactica*. A chain-smoking Dr. Jerk, but he gets the job done. In a Sea of Grey and Gray Morality, he was something of a fan favorite for his pragmatic perspective on his role: he’s a doctor, he treats the sick and the injured, nothing else about his patients really matters.” [8]

Dr. Simon Tam (*Firefly* (2002-2003), *Serenity* (2005)) models a more specialist Archetype 1 physician character. An elite specialist with sci-fi equipment, Dr. Simon Tam is a trauma surgeon “turned fugitive to save his sister from medical experiments” [1] He practices medicine treating the crew aboard the *Serenity*, while serving a semi-psychologist role with his mentally unstable sister River. Dr. Tam acts very surgeon-like and holds a surgical mannerism when utilizing his tools, whether they seem commonplace or of a future era. He’s well kept: he dresses almost reminiscent of a late 1800s surgeon, though that could just be his lavish-lifestyle dress (alongside the cultural style of his home planet), as he is modeled from an early 2000s modern doctor/surgeon.

He does find opportunities to play the “hero-doctor” when utilizing his knowledge of anesthetics to help resolve violent interpersonal conflicts aboard the ship and is maintained as a sympathetic character due to his “dorky” personality and caring relationship with his sister River.

Gattaca (1997) gives us a minor character to serve as an Archetype 1 doctor. In a medical setting where nurses and other medical personnel act as if in a real-world hospital, this world is far advanced in the knowledge and manipulation of the human genome. Dr. Lamar does the genetic testing for the preparing astronauts. He seems like a normal medical doctor. He’s not old like “Bones”, he carries a more pristine-look, fitting with his genetic superiority. Though he’s younger (in his early 40s), he is wise like a doctor. He knew for a large portion of the film about our main character’s (Antoine/Vincent) secret. He’s sympathetic in acting as the confidante for Vincent, and the audience likes him for it. (If Dr. Lamar and many other characters feel the same way toward characters like Vincent, does most of their society feel similarly about the genetic discrimination?) His discretion with Vincent almost breaks down the established “genetic superiority” of the characters by relating to the “genetically normal” audience viewer.

It’s interesting to note that this archetype of doctor is the earliest we see in science fiction film. Even as early as the science fiction of the 1920s we see this archetype utilized as the stock character doctor. In *Metropolis* (1927), within a city of the future, we are presented with a 1920s home-visit doctor, still using modern

tools such as a thermometer, to take care of our main character Freder. He does not have any advanced tools or advanced behavior.

Some archetypes are more or less likely than the others to actually exist in the world in which they are written. Unfortunately, this archetype is the least plausible of the three archetypes. The presence of the doctor as a superimposed modern era doctor in a science fiction setting is almost preposterous after simple examination. It's ridiculous that their costume must always say "doctor", as if to tell the audience. A doctor in a specific science fiction world would dress as a doctor in that specific science fiction world would dress. Also, many Archetype 1 doctors are older, and the demographic for doctors could be younger in the future.

The Archetype 1 physician character is more plausible in science fiction that is nearer-to-future, but that is obvious as they would be closer in time to a modern doctor. However, there is more than just technological advancement that takes place between eras of human history. Cultural progression, social progression, and infrastructural progression are just a few. Sometimes these forces will have a bigger effect on a profession than the technological tools utilized. In the future much will be changed about the world. Will doctors still see people in person? Will the doctor manage patients face-to-face, or will all care be managed without patient-doctor interaction. Maybe all physical ailments will be curable by machines, making the doctor obsolete. However, the discrepancy in the possible existence of Archetype 1 doctors cannot be pointed merely on the doctor. Many other professions depicted in science fiction will show such a superimposition. Nevertheless, if we are to assume that the world created in a science fiction work *is* a correct projective future of humanity, then, yes, the doctor would be somewhat probable. However, when regarding Archetype 1 doctors, the problem is just as much with the work in which they exist (their medical environment) as with the doctor themselves.

This archetype may yet still be a plausible representation of a future manifestation of humanity's real-world doctor. Parts of this Archetype are plausible in being present in the future course of humanity, while other parts of this archetype the modern doctor has already surpassed. The doctors of the past century are not likely to be present as our space doctors. A 1950s era general practitioner

has little likelihood in even the near future, not to mention the far future or the fact that they do not even exist today. However, there are some traits that “have” remained throughout the century. These traits actually would actually be a correct projection of the future. For example, all the doctors of past decades do share a sympathetic human side. Each Archetype 1 doctor is, above all, a caregiver. That is something that could be expanded in medicine in the future. This would depend, of course, on the role technology plays in care, and the infrastructure of the doctor-patient relationship.

Just as science fiction film can serve as a form of social commentary, this doctor shows the contemporary outlook on medicine, diseases/health threats, or the physician of their time. Each Archetype 1 character shows the current public view of medicinal care, and how it is generally received. The diseases the doctor treats are the ones that we fear the most at the current time. When this archetype is portrayed, it may show how the writer may view a doctor is “supposed” to act. The fact that we superimpose a modern profession into the world of science fiction, shows that as the audience we could care less about “how”; we want immediate-results-medical-treatment and friendly compassionate care in our futures. As Merchant puts it: “that’s the techno-utopian dream...fix the body, in a flash.” [3]

This Archetype 1 physician character is present in much of science fiction, and that is due to how relatable of a character he/she is. Within a world of flying cars and shooting lasers, there is nothing more grounding than a real-world persona inlaid into the setting, only differing in their fancy gadgetry. Film viewers appreciate something familiar to which they can ground. Many characters from the earliest science fiction films to the newest flicks today embody this archetype. Unfortunately, this archetype is not very likely to occur in our future, but only because they already exist today (though without futuristic equipment). Nonetheless these physicians make great characters and are some of our favorite medical professionals whom we often enjoy seeing more than our real-world GPs.

Chapter 8 Bibliography

- [1] Simon Carter, "Doctors in Popular Fiction: 'He's dead, Jim' – medicine in science fiction #2", (<http://guerillawire.org/politics/doctors-in-popular-fiction-hes-dead-jim-medicine-in-science-fiction-2/>)
- [2] Brett S. Stifflemire, "Physicians, Society, and the science fiction Genre in the Film Versions of Invasion of the Body Snatchers: or Doctors with a Serious Pod Complex", (<http://scholarsarchive.byu.edu/cgi/viewcontent.cgi?article=3267&context=etd>)
- [3] Brian Merchant (Senior Editor at Motherboard), "Fixed in a Flash: The Utopian Future of Health Care, as Seen in science fiction", (<http://motherboard.vice.com/read/the-utopian-future-of-medicine>)
- [4] Battlestar Wiki, "Sherman Cottle", (http://en.battlestarwiki.org/wiki/Sherman_Cottle)
- [5] Memory Alpha Wiki, (Star Trek Wiki), "Dr. Leonard McCoy" (http://memory-alpha.wikia.com/wiki/Leonard_McCoy)
- [6] Andrew Mickel (Author, denofgeek.com), "Battlestar Galactica's minor stars: Doc Cottle", (<http://www.denofgeek.com/tv/battlestar-galactica/19340/battlestar-galacticas-minor-stars-doc-cottle>)
- [8] tvtropes.org, "The Medic", (<http://tvtropes.org/pmwiki/pmwiki.php/Main/TheMedic>)
- [9] The Firefly and Serenity Database Wikia, "Simon Tam" (http://firefly.wikia.com/wiki/Simon_Tam)
- [10] tvtropes.org, "The Medic", (<http://tvtropes.org/pmwiki/pmwiki.php/Main/TheMedic>)
- [11] J.J. Jonas, "The Twelve Archetypes", (http://www.uiltexas.org/files/capitalconference/Twelve_Character_Archetypes.pdf)

Chapter 9. The Doctor in science fiction: Archetype 2: *Return to Mysticism*.

The second archetype is the least common of the three, and yields some of the most mysterious physicians in science fiction film. While these may not give us the deepest doctor characters, they give us by far the most eccentric, and sometimes the most complex. In some works of science fiction, the field of medicine takes on a form of mysticism, either returning there or developing into such. We will explore this archetype, its presence in science fiction, and its relation to our world.

This archetype has shown a "Return to Mysticism". This doctor mirrors doctors of the past. Often the setting, and how the setting mirrors the world of our past will affect how this doctor embodies a past incarnation. This doctor may possess supernatural facets or abilities, especially if this science fiction world has a supernatural aspect. The mystic physician maintains an esoteric form of knowledge, usually passed from person to person, or sometimes possibly learned at a special school. It is not uncommon for this doctor to have studied under one person specifically, a master, for example, or even gained their knowledge in doctrines found upon a pilgrimage. Their medical skills are usually not specialized; they are able to treat all ranges of ailments. Often, this character is more than a doctor, possibly a multi-faceted disciplinarian. Nevertheless, their knowledge may be seen as more of a "skill" than their sole profession. And he/she may sometimes maintain a few incorrect views of medicine. The general population has a superstition or fear for the mystical, traveling doctor and his/her methods. This doctor will possess special tools that look unidentifiable to the average science fiction character with whom they associate. The Archetype 2 doctor is also known to contain a personal element of self-sacrifice or altruism.

It will be helpful to compare the Archetype 2 doctor to the general view of the physician in science fiction film. While the Doctor who's returned to mysticism is by no means a "Mad Scientist", they certainly retain a level of strangeness alongside their mysticism. In comparing this doctor archetype to the Jungian Character

Archetypes of Literature, this doctor is often the “Magician” or the “Caregiver”. Similar to a physician in general fiction, this doctor may not be the main character, but will often serve as a confidante to our main characters. A key example of this is *Dune’s* Dr. Yueh who serves as an advisor to Duke Leto. This character may begin as “flat” before the development of the plot fulfills their complexities in “roundness”. Yet, due to his mysticism, he may not necessarily be as sympathetic as the main character, but—as his trade goes—he will certainly be helpful to other characters and thus serve as an emotional ground to the audience. Nonetheless, physicians of Archetype 2 are not viewpoint characters.

This doctor is unique to the other doctors in its juxtaposed placement in history. While other doctors in future settings may be suggestive of the future physicians, or share features of present physicians, this doctor archetype has assumed a persona of one of Earth’s past physicians. The three most common era-doctors personified are that of the prehistoric medicine man, the ancient Greek Scholar-Doctor, and the Italian Renaissance Renaissance-man-physician.

This doctor mirrors past-era doctors in many ways. Just as our prehistoric selves “believed in both natural and supernatural means of variably causing and treating diseases,” [3a] this doctor might mix medical knowledge with other beliefs. This gives this physician a view that is shamanistic. Though just as our prehistoric peoples knew some correct information, this doctor is knowledgeable enough to be valuable in his world. It’s possible that this mystic doctors may incorporate the use of herbalism into his medical array, either due to the physics of the science fiction world in which he exists or because his future is that of a post-apocalyptic earth, where the resources available are old world medicines as well as natural elements—plants, animal parts, minerals, etc. His special tools are similar to surgical instruments of past decades, and his esoteric knowledge is almost akin to that learned at the Hippocratic School. And any incorrect views of medicine the doctor holds are akin to the old theories (i.e. humour/channel theory) that maintained in medical knowledge long after their due. The less specialist role of this archetype is similar to that held by the doctor’s of our past.

Unlike the other archetypes, an Archetype 2 doctor is especially correlated to the state of society more so than the medical knowledge or technological advancements of society. Such a societal state that would contain this doctor is present in either a civilization of completely unique culture to our own, or a remnant civilization of complete societal breakdown—so vastly different from a typical progression.

This archetype appears in some subgenres more often than others. These subgenres would be the post-apocalyptic subgenre of science fiction (i.e. the *Mad Max* series), and the alternative universe subgenre (i.e. *Dune*, *The Chronicles of Riddick*).

Such settings that present this doctor are veered in more ways than just technology. There's a certain social interaction and social infrastructure that's differed from ours, either due to a post apocalyptic setting where society has completely broken down, or a universe completely different than our own. These settings are not necessarily projected from our timeline.

A post-apocalyptic setting mirrors a Dark Ages feel, but may also show elements of prehistory. In both settings, there are little or no public health systems or universities, and the spread of ideas through trade and travel is diminished. Thus, a post apocalyptic setting allows little medical knowledge growth. The old-world technology/knowledge of the film is similar to that of the ancient world during the dark ages. (It was the "time before the societal descent".) If the post-apocalyptic science fiction includes a disease/sickness prevalent across the land, then this can mimic Middle-Age Europe and the Black Plague. In science fiction film, medical proficiency may be only operational enough to merely be a skill, not necessarily an entire profession. Such was the way of prehistory and pre-Greek ancient history. In addition, medical knowledge may have been obtained from a journey. Similar to Christian pilgrimages during the crusades that lead to the spread of medical knowledge from the Middle East.

The other common setting for this archetype is the alternative universe-future. Often these futuristic worlds possess cultures that correspond to those of the real-world ancient Greeks or of the Italian Renaissance. Such a world would possess

special schools for education in specific disciplines. Special societal statuses and ethical standards would be tied to those attending these schools. These schools yield similarities to the Hippocratic schools and early renaissance medical schools. In this future, a patronage system may exist for the nobility for contracted services from the artisans/professionals. Such was the way of the patronage system of the Italian Renaissance or the Ancient Greek “public” status of some doctors. In addition, these doctors might hold a status similar to the Middle East “doctors in Bagdad, Damascus, Harran, Baalbek, Aleppo, or Edessa [who] were brilliant scholars and cultured gentleman.” [4] The only difference this world might present from the Italian Renaissance, would be that many Archetype 2 doctors might create their own medicines, whereas Renaissance doctors were known to have separated from their apothecary counterparts.

The real world might only get to these states in a few ways. The first—and unfortunately, more possible way—would be through an apocalyptic event, such as a major epidemic or a nuclear war that would regress our world into a near-destroyed state. A future similar to that of an alternate universe science fiction film would exist truly only in the far, far future of our existence. However, a society rebuilt from the ashes of a post-apocalyptic society may yield a different culture than present today, and that itself may present a different role for the physician.

This Archetype is present in fewer examples than the other two. However, the examples presented are strong enough to warrant the creation of this archetype. In the post-apocalyptic setting of the *Mad Max* series, we view an apocalyptic Australia. In the most recent installment in this series (*Mad Max: Fury Road (2015)*), we see the character known as the Organic Mechanic. Though this doctor doesn’t live or dress the “mystic”, because he dresses normally for the society in which he lives (a society in which all people actually dress in a fashion modern people would consider “odd”). He actually may appear “mystic” to the other characters of his society in that he would appear most “normal” to us. He is eccentric for his society in that he is involved in a more technical suit than the rest of the chaotic “War Boys” he lives amongst. His skills are highly revered among his people allowing almost for a special privilege amongst the leaders of the region.

The *Chronicles of Riddick* (2004) presents a unique setting for study. It is an alternate-universe future that yet has many post-apocalyptic world elements (despite not being a place of post-war or post-epidemic). The Planet visited second in the film, New Mecca, might present some Archetype 2 doctors.

An interesting note is the doctors present in the future of the film *Mr. Nobody* (2009). While these doctors aren't by any means Archetype 2, they do hold an almost esoteric-type knowledge over the human body the only applies to Mr. Nobody (as he will be the last human to ever die).

Dr. Zaius in *Planet of the Apes* (1968), is an Archetype 2 physician. He holds knowledge and medical knowledge from tenets of ancient text that are passed down through the leaders of his Assembly, and in his multiple disciplines he acts very much like a Hippocratean. His knowledge does possess some beliefs in the supernatural. The Planet of the Apes Wikia gives reason to his decision:

He saw no contradiction between his two roles but in the end he chose to emphasize the blind faith of the ape religion and traditions over the scientific suggestions of the chimpanzees, preferring a stagnant, imperfect, faith-based ape culture that kept humans in check, to the open, scientific, human-curious one. [4]

In this way, he serves as a foil for the more scientific Dr. Zira within the same film. Medicine is more of a side-skill for him, as he holds more interest in his positions as leading member of the Ape National Assembly, and Chief Defender of Faith. It's also noteworthy that he exists in a setting that is partially post-apocalyptic, partially alternate reality.

The most potent example of the Archetype-II doctor from an alternate-universe future would be Dr. Yueh from *Dune* (1984). Dr. Yueh is a member of the Suk school of Medicine. This school shares traits of the Hippocratic School and early Renaissance medical academies. He has exceptional abilities in medicine, enough to

be proficient in the wide-range of all human ailments. His practice of medicine carries with it some supernatural components.

The film *Dune* and the Suk School within hold such an application to this Archetype that it is beneficial to examine them more closely. Upon analysis we will see many similarities between the Suk School and the academies of our past. According to the Dune Wikia, The Suk Inner School (which contains the Suk Medical School) "is devoted to finding cures for the ailments which plague humanity and advancing man's medicinal knowledge." The Suk doctors of the Suk School hold an almost esoteric form of knowledge amongst each other. These doctors possess an aspect of mental conditioning, "in that they can never take a human life" [1]. This conditioning stands as the modern equivalent of the Hippocratic phrase "first, do no harm". Physically exhibiting mysticism, they wear a "diamond tattoo on their foreheads" and a "silver ring" binding their long hair. [1] The Suk Doctors are known for their high moral code; they never betray a patient (although this was due to their advanced mental conditioning). Though Dr. Yueh did end up betraying his patron lord, but that was because an enemy had found a way to work around said conditioning.

Many doctors of the school serve almost a patronage-like status among the lords they work for. This is organized by the Suk School itself who chooses which doctors to assign under different noble houses.

These Suk doctors possess exceptional knowledge of medicine. Exceptional in clinical ability and range: they are different from doctors of our time, as they hold all medical knowledge while the modern physician is becoming more specialized.

The Suk school fits a Hippocratic-school or Renaissance medical academy type model, who's devotion to scholarship is best modeled by their founder Mohandas Suk's belief that "humanity should be prepared to face all the tragedies and had the idea that important victories are won in hospitals as much as on battlefields." [2] The high morality of their physicians fits that of a Greek Hippocratic doctor who also placed high standards on moral code or a Catholic monastery herbalist with their faith-based high level of literacy. In addition, the patronage-style

system of placement under great lords models that of renaissance patronage of the arts. Renaissance men were frequently contracted under the nobility.

An Archetype 2 doctor is the most difficult to evaluate in terms of plausibility as not only is the world in which they exist technologically different than our own, but it includes a vast cultural gap as well. This Archetype 2 mystic doctor fits well into a post-apocalyptic setting. One would expect an individual working with the knowledge and technology of a prior age to do so with limited ability, in conjunction with supernatural beliefs, and with an image of skepticism. An individual in an alternate universe science fiction is almost, by definition, plausible. When imagining another universe—not necessarily projecting a speculative future from our own—many elements (though rooted in physical laws) are the work of fantasy. The character can thus not be improbable, because he or she is defined by the author.

The doctor of real-world humanity is least likely to follow this Archetype in the modern course of the physician's evolution. The setting of the future would have to physically and culturally advance to an unrecognizable point or more likely, a nuclear holocaust would have to occur. The latter case is more probable, and if that, in fact, is the case, then this Archetype becomes the most probable of the three.

This Archetype may show our modern age's hope for care. The viewer appreciates the physician character. He or she appreciates the grounding in a science fiction film, and a sympathetic character to which they can first relate. That this character exists in the underworld of post-apocalyptic or the utopia of a vastly different parallel universe, shows society's "want" for a doctor, a healer, in any world in which humanity might be a part.

The Archetype 2 doctor has returned to mysticism, our historic past. Yet in doing so, he has not lost any expertise in his field, he may be doing the best he can to provide care in a post-apocalyptic setting, or may be more advanced than any physician imaginable in our reality. Unfortunately, this expert multi-disciplinary scholar-doctor is furthest from the possible course of our modern doctor in the changing world of contemporary medicine. Yet as long as there remains some "art" in the science of medicine, a bit of mysticism will be present in tomorrow's healthcare professional.

Chapter 9 Bibliography

- [1] Dune Wikia, "Suk Medical School",
(http://dune.wikia.com/wiki/Suk_Medical_School)
- [2] Dune Wikia, "Suk Inner School",
(http://dune.wikia.com/wiki/Suk_Inner_School)
- [3] Medical News Today; A History of Medicine
(<http://www.medicalnewstoday.com/info/medicine/>)
 - [3a] Medical News Today; What is Prehistoric Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/prehistoric-medicine.php>)
 - [3b] Medical News Today; What is Ancient Egyptian Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/ancient-egyptian-medicine.php>)
 - [3c] Medical News Today; What is Ancient Greek Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/ancient-greek-medicine.php>)
 - [3d] Medical News Today; What is Ancient Roman Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/ancient-roman-medicine.php>)
 - [3e] Medical News Today; What is Medieval Islamic Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/medieval-islamic-medicine.php>)
 - [3f] Medical News Today; What is European Medieval & Renaissance Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/medieval-and-renaissance-medicine.php>)
 - [3g] Medical News Today; What is Modern Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/modern-medicine.php>)
- [4] Arthur Selwyn-Brown, "The Physician Throughout the Ages", [Book on a Website],
(<http://babel.hathitrust.org/cgi/pt?id=uc1.31822005029525;view=1up;seq=7>)
- [5] Stratmann, H. G. *Using Medicine in science fiction: The SF Writer's Guide to Human Biology*. Cham: Springer, 2016. Print.

Chapter 10. The Doctor in Science Fiction: Archetype 3: *Doctor turned to Technician.*

The first two science fiction Physician Character Archetypes showed us doctors who were fairly normal individuals in terms of social interaction. This third category differs from the other two in that it is missing the human element that the others maintain. The third major archetype is known as the *Doctor turned to Technician*. In this section, the archetype will be described in full and in relation to general physicians in general fiction and science fiction. We will ascertain the type of science fiction future in which this physician exists and discuss the ways in which this archetype is unique. The science fiction subgenres in which this archetype most frequently is exhibited will be identified, and various examples of this physician character will be examined. Next, I will evaluate the probability of this archetype to exist in the worlds in which it was written. Finally, I will assess this type of physician as a means of projective speculation, and the plausibility of its existence in the modern course of humanity.

The Archetype 3 *Doctor turned to Technician* is feasibly the least noticeable as a doctor. It is, as its title describes, a physician turned into a technician. They possess a whole host of medical knowledge at their disposal, and due to that, the diagnostician in their profession has become a less necessary part of the clinician. Merely needing to “point-and-click” to access treatment from a database, the human care-taking element has seemed to disappear from the physician, leaving only the machinist, or sometimes just the machine. Yes, this doctor is most commonly human like the other archetypes, but a large plurality of this type of doctor exists on a spectrum from human to robot, including android, hologram, and formless artificial intelligence.

This doctor doesn’t necessarily dress like a doctor. For that reason, they aren’t as distinguishable by the viewer of the science fiction film. This physician archetype utilizes high-tech equipment. As a “machine operator” that may be the

only thing they do, or maybe they only utilize such high-tech equipment, because they *are* the high-tech equipment.

On the spectrum of general-to-specialized medical knowledge, this doctor exists at the specialist end or across the entire spectrum. Most of our technician doctors are extremely specialized, being only able to operate within the functionality of their tools, not “thinking” of much else. The Archetype 3 doctors we find that can treat everything are full-spectrum, general *and* specialized. They possess the entire record of human medical knowledge, and as such, can be as specialized for as many areas as necessary.

In terms of patient care, this physician archetype maintains a neutral rapport with his/her patients. Little chat or bedside manner is necessary when an algorithm can easily determine the patient’s ailment and the best course of action for treatment. This technician may even operate from afar, via telemedicine or telesurgery, never having to interact with those they treat. Physicians of this archetype will rarely have to make use with limited resources. The setting in which they exist is often that of a well-developed and resourced future. As such, they are often provided with all they need, constantly.

These doctors are still characters derived from physician characters in general fiction. As such, many derived traits can be identified. Of the General Jungian Fiction Character archetypes, the Technician Doctor is likely seen as the “Caregiver” or—if taking a more sinister role within the fiction—the “Magician” as well. Of all the Jungian Archetypes, this doctor can be representative of “The Orphan”, as they sometimes are a typical “everyman operator”. Unexpectedly, if—for whatever reason—the character is a robot attempting to gain more human-like traits, they may at different times show any of the archetypes (notably, the Innocent, Hero, Explorer, Jester, etc.).

Despite low bedside manner, there are times when this physician archetype may act as a confidante. The few times they listen to the patient for information, are perhaps the only times when they will “reveal their personality” while concurrently unveiling their own nature to the audience. [6] These technician doctors often maintain as a “flat” character, being very static in characterization. And unlike

common physicians in science fiction films, these doctors are frequently stock characters. Yet similar to other doctors, this archetype does not often include viewpoint characters. Also similar to other science fiction doctors, this character's presence in a fictional work gives us "insights into contemporary concerns about how medicine is performed." [1] And for this far-different-from-our-world medical professional, concerns about where medicine is headed.

This archetype still exhibits many of the commonalities present amongst all doctors of science fiction. This doctor is only as supporting of a character as he is part of the main cast. Too often, this Archetype is "part of the setting". This physician character need not be human: this physician may be alien or robot (often is robot). The doctor is able to treat extraterrestrials and provides "quick fix" medical care. However, this doctor does not have to enact "Doctor's Orders" or illicit "M.D. Envy". Usually, the bureaucracy of the system in which it is a part—or the little override capabilities of the machine in which it is a part—limit any interference or expression of personal superiority.

Between the character-typings of the general fiction and general science fiction doctors, the Archetype 3 doctor can be found as several of them. It exhibits "The Watson" in his or her "matter-of-fact" stating of information, the Evil Villain if part of a threatening artificial intelligence, "The Medic" if that *is* their technician job, or the Ass-hole/"Dr. Jerk" in their tactless bedside manner.

This character archetype is able to break from relating to general fiction and general science fiction physicians, the more that that—within their work—they are trying to adopt a human side.

This archetype is unique in that it is used either to show the most or least projective speculation. It's cold, omniscient, yet emotionless form of medical care may be used to show what the writer may suppose medicine may be like in the future. This archetype is also used to provide a quick fix for injured characters, so the film can get back to other features of the film the writer/producer/director wants to address. It also possesses the ability to illuminate the human characters through their reactions to doctors of the archetype.

This physician archetype only exists in certain futures, however. It exists in science fiction settings where professions are becoming automatized and human work is becoming obsolete. The author of Paleofuture blog, Matt Novak points out in an article, such an episode in the *Jetsons* (1962-1988) that is “arguably the darkest in its message to kids that one day you may very well be replaced by a machine.” [4] In this episode we are introduced to the robot Uniblab, who is “[George Jetson’s] rival, rather than his helpful co-worker.” [4]

There are a few common subgenres in which this archetype is most present. We find this doctor most in the extremely technologically advanced worlds. Such are those of Utopias and even Dystopias. We also view this technician doctor in the far future. A more miscellaneous category of science fiction that exhibits this technician doctor would be Science Fantasy.

There are many examples of the archetype in science fiction film. In *Star Trek: Voyager* (1995-2001) our Chief Medical Officer aboard the USS Voyager is the Emergency Medical Hologram Program (abbreviated “EMH”). Originally intended only to function in emergency situations, the ship’s sudden relocation to the Delta quadrant warranted him remaining operational at all times. He is a complete medical database. He is the machine and the operating technician described by the Memory Alpha (*Star Trek*) Wikia as being “capable of treating any known injury or disease.” [7] In this way, he provides that instant-fix medical care.

Yet, our EMH Doctor was designed to exhibit some features of a professional doctor for those to whom he administered care. As described by Carter “This mimicking included a number of humorous stereotyped doctors qualities.” [1] Among his doctor-emulating programming included occasionally “being unhappy about his working conditions”, and maintaining a “computer induced arrogance of perceiving himself unable to make mistakes.” [1] His personality traits and general tact as a hologram, provided the occasional comic relief, often unbeknownst to him. Why might a hologram character need these personality traits? It’s possible such traits were included because viewers at the time needed *some* typical physician characteristics for a sort of grounding. Or possibly, even the other members of the

crew needed some sort of grounding when being treated by an artificial intelligence. The inadvertent comic relief also provided such grounding.

At his core, he is a computer program, and initially was treated as such by his crew: "they never addressed him directly, they barely listened to him, and often exited his presence without deactivating his program." [7] The EMH Doctor maintained a robotic personality. To those he treated, "He, in turn, was curt and rude to them, lacking empathy and bedside manner." [7] As the show progresses we see this technician doctor aspire to acquire more of a human condition and qualities. Beginning first by assisting the former Borg drone Seven of Nine in regaining her humanity, his work with her would continue his curiosity in cultivating his own human element. According to Memory Alpha (Star Trek) Wikia, he "expanded his program a great deal; he acquired many interests and hobbies, developed close personal friendships with many crew members, and even fell in love." [7]

Another example of these archetype doctors exists in *Fahrenheit 451*. We are introduced to two "handymen" who operate the machine that pumps Guy Montag's wife Mildred's stomach and replaces her poisoned bodily fluids. The handymen act nothing like doctors, hardly technicians. They are machine operators basically. Montag had concern that there were not any doctors present in her medical care, yet in the future world in which he lives, a doctor would be largely unnecessary in this situation. Technology makes the solution a quick fix, and Millie even goes about her daily routine the next morning not even recalling the incident the night prior.

Many claim *Star Wars* to be one of the great classic films of science fiction, yet others argue that it's elements make it more of a Science Fantasy. Nonetheless, we are never exposed to any "living" medical professionals. All of the medical personnel are droids (robots) who operate bacta tanks and perform limb replacement and obstetrics.

1976's *Logan's Run* has the character Doc serving as a plastic surgery doctor in a Utopian city. Though he does yield good bedside rapport with his patients, he operates as a technician. He mostly serves as a good example of this archetype because he is only seen operating a bunch of medical (cosmetic) technology. In fact, there is little "doctor"-ly about him. Interestingly enough, he is part of the

underground runner sanctuary group; he serves as a confidante for many characters hoping to enter the sanctuary.

The character simply named "Robot" in *Robot & Frank* (2012) is a blocky shaped, eldercare-providing robot. He is a specific type of eldercare robot who is programmed to help older individuals with daily tasks, dispense medication to them, and is able to contact medical or emergency services if need be. For our elder protagonist Frank, he "cleans up Frank's cluttered house, cooks him healthy meals, and encourages Frank to start a garden and engage in other physically and mentally stimulating activities." [5] In terms of personality, he has a very "basic", essential-only personality, yet he acts as a confidante to Frank. Jonathan Kim (film critic for ReThink Reviews) describes Robot's developing characterization: he began as "an outsider who became a repository for secrets, stories, and advice." [5] In this way, Robot becomes a digital collection or a "library" of Frank's life. In such a way, we are displayed a change in "flat" characterization to "round" characterization. Robot is an example of an Archetype 3 physician who aspires for a more human element.

In Disney's *Big Hero 6* (2014) we are familiarized with the lovable robot Baymax, a healthcare robot, more than capable of caring for patients. Though he doesn't act human, he is a robot made to exhibit human-acceptable compassion and bedside manner. His presence in a kid's movie, maybe shows a reflection of how we'd see a "happy" version of a technician physician in the future.

According to the Disney Wikia, "he is highly intelligent in the world of medics, devoted, and extremely caring for his patient, in question," and his official description gives further information on his medical abilities: ""With a simple scan, Baymax can detect vital stats, and, given a patient's level of pain, can treat nearly any ailment." [8] "Good" vs. "Bad" technology is a classic dilemma in science fiction, and though we often see any future with robotic replacements for human professions as a cold and soon-to-be-dystopian future, it's possible that the opposite is initially intended. The creator character, "Tadashi's goal in creating Baymax was to help improve healthcare around the world, basically wanting nothing more than to use his creation and genius for the betterment of humanity." [8] Maybe that's what modern healthcare is attempting to do?

In two films, we see medical machinery that serves the role of total physician. These differ from robots in that they lack the ability for social interaction. In *Prometheus* (2012) and *Elysium* (2013). These machine act as a *Star Trek* tricorder and a total cure-all, all in one. Working in both curative and preventative medicine, the crew of *Prometheus* do not even bring a doctor aboard their mission, and those living among the affluent neighborhoods of *Elysium* make less doctor's visits as they take a 60 second full-body physical every morning.

This archetype is actually fairly plausible in the world in which it is written. The futures in which these doctors exist are often utopian/dystopian or far future enough that advanced knowledge and technology exists. When viewing a film, it's evident that such advancements dominate many fields besides medicine. It's relatively doubtless that the diagnostician will become an automaton. Why would the healthcare system risk the potential for false diagnosis, when a simple algorithm of ample medical knowledge can identify the problem flawlessly?

The archetype 3 *Doctor turned Technician* is highly plausible in the modern course of real-world humanity's doctor. Doctors have become more and more specialized over the course of the professions' history. At a point in history, doctors diverged from creating the medications. At a closer point in history, they diverged from working on the human body in its entirety. At what point will they diverge from the humans with which they once worked, or from knowing the science of medicine. Already, the growing bureaucratic sector of the healthcare industry is taking away the decision-making component from the profession of the physician. In addition, the physician is left with little time to interact with their patients due to high levels of paperwork and test running that is required by insurances and HMOs. This archetype is sustainable as long as there is increasing medical knowledge and scientific advancements. The level of simplicity that healthcare can have with such absolute knowledge makes utilizing such scientific advancements too efficient to be overlooked.

It is interesting to note that many of these physician characters present in science fiction film are not complacent with their status; they aspire for a more human element. It may simply just be that any fictional character needs some sort of

internal dilemma with their life's purpose, however it seems that such discontent is present even today. Modern medical doctor Sandeep Jauhar states in his article "Why Doctors Are Sick of Their Profession", "We need systems that don't simply reward high-volume care but also help restore the humanism in doctor-patient relationships that have been weakened by business considerations, corporate directives and third-party intrusions." [9] We may find such aspirations to be true in the future of humanity's doctors if they become more operator than Hippocratic.

This archetype of physician character is present in much utopian/dystopian and far future science fiction films. It presents us with examples that are as simple as pure technological efficiency and as cold as human obsolescence, and highly probable to exist in the worlds created by their films. Through examination we come to learn that it's the most robotic of the examples that desire that lost human condition. For how plausible this physician could be in future human society, it may, in actuality, prove to be less culturally sustainable than physically sustainable.

Chapter 10 Bibliography

- [1] Simon Carter, "Doctors in Popular Fiction: 'He's dead, Jim' – medicine in science fiction #2", (<http://guerillawire.org/politics/doctors-in-popular-fiction-hes-dead-jim-medicine-in-science-fiction-2/>)
- [2] Brett S. Stifflemire, "Physicians, Society, and the science fiction Genre in the Film Versions of Invasion of the Body Snatchers: or Doctors with a Serious Pod Complex", (<http://scholarsarchive.byu.edu/cgi/viewcontent.cgi?article=3267&context=etd>)
- [3] Brian Merchant (Senior Editor at Motherboard), "Fixed in a Flash: The Utopian Future of Health Care, as Seen in science fiction", (<http://motherboard.vice.com/read/the-utopian-future-of-medicine>)
- [4] Matt Novak, (Author of Paleofuture Blog), "The Episode Where George Jetson Rages Against the Machine", (<http://www.smithsonianmag.com/history/the-episode-where-george-jetson-rages-against-the-machine-146315456/?no-ist>)
- [5] Jonathan Kim (Film critic for ReThink Reviews), "ReThink Review: *Robot & Frank* – High-Tech Golden Years", (http://www.huffingtonpost.com/jonathan-kim/robot-and-frank-review_b_1822837.html)

- [6] ([Adapted from "You and Your Characters" by James Patrick Kelly: <http://www.sfw.org/writing/character.htm>]), "English 250 Fiction Unit: Characterization 1 – Character Types" (<http://www.ohio.edu/people/hartleyg/ref/fiction/character1.html>)
- [7] Memory Alpha (Star Trek) Wikia, "The Doctor", (http://memory-alpha.wikia.com/wiki/The_Doctor)
- [8] The Disney Wikia, "Baymax", (<http://disney.wikia.com/wiki/Baymax>)
- [9] Sandeep Jauhar, "Why Doctors Are Sick of Their Profession", (<http://www.wsj.com/articles/the-u-s-s-ailing-medical-system-a-doctors-perspective-1409325361>)

Chapter 11. An Aside into Star Trek: Progression of the crew's Medical Doctor between series.

The archetypes presented represent a near-comprehensive categorization of the physician characters depicted in science fiction film. Each archetype is unique and classifies a different type of character, and represents diverse views on speculation of future medical practice. While we see all three of the archetypes within different films produced today, initially in science fiction film there were more Archetype 1 doctor characters than the other two. The increase in category proportionality over time may signify an association between each category: a growing presence of Archetype 2 and 3 physician characters may show a "progression" in how the modern audience views a futuristic doctor.

One well-known science fiction television series that has always exhibited a physician character as a major component of its main cast has been *Star Trek*. According to Carter:

A constant feature of all the 'Trek' franchises has been the central role of the star-ship's Doctor with each recreation of the physician being distinctive and mirroring key aspects of the position of medicine in the era in which it was created. [1]

A show well-ahead of it's time in terms of futuristic speculation, "the show was originally intended to have a progressive political agenda and use the freedom of the science fiction genre to deal with contemporary social issues in an enlightened way". [1] The progression of the series itself shows speculation as well. With its major series' spanning from 1966-2001, the show includes a long time period in which the physician characters are categorized among the varying archetypes. Throughout the successive series we observe a transformation that

illustrates an “evolution” of task and function of the physician character and the contemporary views of future medical care.

There has always been a physician character as part of the main cast of each show in the Star Trek series. This character is known as the Chief Medical Officer. A member of the senior staff, according to the Memory Alpha (Star Trek) Wikia, “CMOs aboard a starship or starbase were directly in charge of the sickbay or infirmary”, and his or her “primary duties were the oversight and maintenance of the overall health and physical fitness of crew and passengers.” [6] By examining each Chief Medical Officer in *Star Trek: The Original Series*, *Star Trek: The Next Generation*, *Star Trek: Deep Space Nine*, and *Star Trek: Voyager*, we will be able to determine trends in the proportion of each archetype categorization and explore the significance of such a progression within the show. As Dr. Leonard McCoy, and the EMH Doctor had deeper analyses prior in the thesis, they will be reviews in this section, while the doctors in the other two series will be given a more in-depth examination.

Dr. Leonard McCoy from *Star Trek: The Original Series* is a classic example of an Archetype 1 physician character. A well-learned, general practitioner of the future, he was reminiscent of a typical 1960s doctor superimposed into a starship of the 23rd century. He is an expected depiction for a 1960s science fiction television show and for the first of a series.

Following *Star Trek: The Original Series* is *Star Trek: The Next Generation* first aired in 1987. Though, not peculiar today, at the time a large change in casting occurred for the Chief Medical Officer of the Enterprise, as a typical male doctor was replaced with a female professional. Carter elaborates on the setting of this series choice: “this change from ST:TOS, where the most senior female was the communication officer, is significant and reflects more general debates in the 1980s media about gender equality.” [1]

Dr. Beverly Crusher is “in all respects a superwoman”. [1] Besides representing a 1980s powerful woman professional, she is also a single mother. Her character is a projection of the rising feminism of the time. She has it all: a child, a prestigious profession, a widowed-housewife/head of family role, a life of

adventure, power, etc. If a woman of the future could have and be all of that, then what limitations does the woman of today have?

Dr. Crusher was the Chief Medical Officer aboard the USS Enterprise-D and USS Enterprise-E, and during her career, she took a brief leave as Chief Medical Officer to serve as head of Starfleet Medical. [3] She was inspired to go into medicine after watching her grandmother using herbalism for medical care after a shortage of regular medical supplies. [3] She would maintain a concise knowledge of herbalism that she would utilize throughout her Starfleet career.

She is also a Physician-Scientist: She created the surgical techniques utilized to remove Borg implants, and did research and wrote papers on many topics such as cybernetics and ethnobotany. Nonetheless, she is above all a clinician and holds patient care as a priority. Her "empathy for her patients and her concern for their care above everything else occasionally caused problems," and she has had to utilize "Doctor's Orders" on superior officers on many occasions. [3]

She acts as a confidante for Captain Jean-Luc Picard, initially knowing only medical information, but eventually other secrets that other crewmembers might not necessarily know. In regards to her medical practice, she is relatively conservative in terms of utilizing experimental treatment. In one episode, she had to relieve a guest neuroscientist "from duty after she used one of her experimental drugs to treat a disaster victim when a traditional medication would have saved his life." [3]

Though technically still an Archetype 1 Doctor, Dr. Crusher is the first progressive step away from a "space-GP" in *Star Trek*. Best summarized by Carter:

Dr. Crusher is not only a senior officer in the Enterprise crew, who now leads a medical team and is a close confidante of the Captain, but she is also a single mother who on occasion commands the star-ship. [1]

In the following series, *Star Trek: Deep Space Nine* (1993-1999), we are familiarized with Dr. Julian Bashir, who served as Chief Medical Officer on the

Federation Space Station Deep Space 9. Dr. Bashir was physically small and unintelligent at a young age. His parents had him undergo a series of treatments known as “accelerated critical neural pathway formation”. [4] These treatments genetically re-engineered his DNA, heightening his mental prowess with increased IQ and enhancing his physical capability with increased reflexes, stamina, and height. Federation Eugenics laws made such practices illegal. When his genetic engineered status was revealed years later during his career, Bashir’s father “accepted incarceration for violation of eugenics laws.” [4] This allowed Bashir to keep his good standing.

Multi-disciplined, Bashir was a physician-scientist. “One of [his] most notable projects was on biomolecular replication.” [4] He also worked on “immune-therapy projects of T-cell anomalies”, some cures for addictions, as well as treatments to be used to remedy the effects of some biological weapons.

In his time serving as Chief Medical Officer, Bashir was able to relate well to the android Data. According to the Star Trek Wikia, Bashir was surprised at how often “people [were] more focused on how he was *different* from Humans rather than how he was *similar* to them.” [4] Maybe Bashir found some commonality between himself and Data, as being a genetically modified organism, he is a product of engineering as well. Maybe Bashir even appreciated the extended capabilities of the android, even if they came with less humanity.

Bashir’s genetic enhancements separate him from his human condition. Intellectually, “he was able to perform complex computations faster than a computer and his recall was almost absolute” [4]. Physically, “His hand-eye coordination is greatly enhanced to the point where he can hit the smallest part of a dart board with ease at over eight feet, his hearing is also enhanced beyond that of a normal Human, and his reflexes are closer to a Vulcan.” [4]

The societal views of genetic augmentation are seen in the *Star Trek Original Series* villain Khan Noonien Singh. Khan leads a band of genetically enhanced beings who were exiled into deep space. Though Bashir keep good rapport with his patients, it is possible those he cares for do feel a slight divergence from him. He still acts as a doctor, but he is converging onto the spectrum of robot doctor.

Star Trek: Voyager (1995-2001) features the EMH Doctor. The series makes a total transition from a genetically modified human to a complete artificial intelligence personality. "Now the ship's hologram becomes a hologram 'made human' by a sophisticated software routine that gives this artificial intelligence (AI) a male form." [1]

The EMH Doctor was still designed with many the traits representative of a physician's personality, however he still stands as an Archetype 3 *Doctor turned to Technician*. His comprehensive medical knowledge and limited bedside manner has removed the diagnostician and human empathy from the profession. Carter writes, "The AI doctor reverberates with the changing medical environment of the 90s with the increasing use of 'intelligent medical devices' in health care and debates about the deskilling of medical practice." [1]

Throughout the series a progression from the Archetype 1 Physician character to the Archetype 3 physician character is present. In Dr. McCoy we see a strict representation of the *Same era doctor with new equipment*. This archetype becomes a looser definition with *The Next Generation's* Dr. Crusher. Though still representative of a doctor from her series' production era, she takes on many traits that make her differ from the typical physician. In Dr. Julian Bashir, we view a doctor who, though still human, possesses many qualities separating him from the "normal" human. Due to his genetic engineering mentally and physically enhancing his person, he not only possesses exceptional medical knowledge and skill, but almost diverges from the humans whom he treats. Finally, we view the complete transformation to the Archetype 3 physician in the EMH Doctor. This doctor is intrinsically connected to a complete database of medical knowledge, lacking the need for a bedside manner with patients for more reasons than just the lack of necessity for a diagnostician aspect.

This progression shows more than just a switch in characterization style between the series. The sequence shows an "evolution" of speculation of how a doctor will exist within the future. All physicians are similar in that the "representations of health care in all the various Trek outings share a set of positive characteristics, such as: equality of care, even for different alien species; and

unselfish concern for the welfare of patients," [1] yet they differ in their speculative prowess for the future. In the production of *The Original Series*, it seemed plausible at the time that a future physician would only differ in physicality of function, not necessarily culturally or socially. *The Next Generation* gives us an individual who differs by not being a typical representation of a physician. Though one could argue that a female Chief Medical Officer might only be a reflection of the increasing rates of female doctors and not necessarily a projective speculation of what the future may hold, the show speculates the future in projecting a contemporary trend (increasing female physicians) onto the future. (This projection would actually hold true in the next few decades.)

Deep Space Nine would show more of change in the Chief Medical Officer's depiction, as the genetically engineered Julian Bashir would reduce the human empathy and relatability of the profession. In addition to being not purely "human", his frequent level of "book-smarts" that counters his practical knowledge is predictive of a future physician with a host of medical knowledge, yet without a diagnosing component being necessary. Such a physician is more closely seen in the EMH Doctor in *Star Trek: Voyager*. This doctor is the comprehensive medical database. Initially, the Doctor completely lacks a human-relation component. Able to provide quick-fix treatment without needing to interact with the patient, the Chief Medical Officer is now nothing more than a *technician* of medicine. It's intriguing then that throughout *Voyager* the EMH Doctor aims to foster a human condition within himself. He finds his "operator" role to be unfulfilling, and throughout acquiring human empathy excels in interaction with others and as a Chief Medical Officer.

This shows that at the time of production, each audience might have only been able to speculate so much about the role of a career in the future of human history. Maybe society's speculative proficiency was not far enough advanced at the time, or maybe audiences of the earlier shows needed more "grounded" elements in their science fiction. The presence of proficient Archetype 1 physicians in the first two series shows a positive outlook on the far future of humanity. The final depicted EMH Doctor's cold, human-less clinical care may show a generally more negative

outlook on this far future, although it shows one with a hopeful longing to regain the positives of the past.

If these portrayals are reflections of the society/time in which they were created, it may show there is already change taking place within the modern medical world that is trending from doctors being the typical Dr. McCoy to doctors becoming more akin to the EMH Doctor. This may speak to a future medical world in which doctors operate as such. This would imply that speculation for the future is decently accurate in *Star Trek*. Consequently, the series' medical care includes other facets that may indeed transpire in the future. According to Carter, "The delivery of medical care is always represented as taking place within a quasi-military context..." [1] and "the use of health care is itself sometimes unproblematically used for managerial and military surveillance." [1] On one occasion, Captain Picard utilized the ship's counselor Deanna Troi's supernatural empath abilities to furtively determine hidden motivations of enemies, as well as fellow staff. Could such surveillance and deceptive tactics be present in our healthcare future?

Star Trek has always been a forward-thinking show exploring a wide-range of themes and even utilizing it's narrative to delve into many contemporary issues. Providing a good source of future speculation, *Star Trek* provides perfect examples of physicians in a science fiction setting. The change in the form and function of the position shows a progression from Archetype 1 doctors to Archetype 3 doctors. This evolution represents a change in the medical professional from what we see today as a doctor, to a doctor acting as more of a *technician*-machine longing for that lost human element. Such a trend holds much in terms of future contemplation. Being impressions of the views of contemporary society of medicinal science, practice, and healthcare, it may be an accurate prediction of things to come.

Chapter 11 Bibliography

- [1] Simon Carter, "Doctors in Popular Fiction: 'He's dead, Jim' – medicine in science fiction #2", (<http://guerillawire.org/politics/doctors-in-popular-fiction-hes-dead-jim-medicine-in-science-fiction-2/>)
- [2] Memory Alpha Wiki, (Star Trek Wiki), "Dr. Leonard McCoy" (http://memory-alpha.wikia.com/wiki/Leonard_McCoy)
- [3] Memory Alpha Wiki, (Star Trek Wiki), "Beverly Crusher", (http://memory-alpha.wikia.com/wiki/Beverly_Crusher)
- [4] Memory Alpha Wiki, (Star Trek Wiki), "Julian Bashir", (http://memory-alpha.wikia.com/wiki/Julian_Bashir)
- [5] Memory Alpha (Star Trek) Wikia, "The Doctor", (http://memory-alpha.wikia.com/wiki/The_Doctor)
- [6] Memory Alpha (Star Trek) Wikia, "Chief medical officer", (http://memory-alpha.wikia.com/wiki/Chief_medical_officer)

Chapter 12. The Changing Contemporary Medical World.

The eras of human history have shaped the world of medical care and molded the individuals who pursue careers within them. Like any era from the past, modern medicine is distinct in its contributions to human healthcare. The contemporary world and the near future will have a strong influence on the career of the physician.

The modern world has many luxuries that previous periods of human history did not. Developed countries' access to clean, disease-free water, clean air, stable shelter, protection from the elements, sewage systems, and food has had such a large impact on societal human health that the modern medical world must be viewed as being different than the of past eras when studying them. According to Guy J. Lavoipierre, former epidemiologist of the World Health Organization, new disease and illness in developed countries persist as the new threats to modern life. He presents two categories: (1) Lifestyle-inflicted, and (2) Age-related. [2] The first-world dietary and sedentary lifestyle may inflict "cardiovascular disease, hypertension, obesity, osteoporosis, diabetes, and some pulmonary diseases such as chronic bronchitis, emphysema and lung cancer." [2] Furthermore, with the longevity enjoyed by those of the world's developed countries, age may deteriorate one's body through "a variety of cancers, severely crippling arthritis and diseases associated with brain degeneration such as Alzheimer and dementia." [2]

To treat contemporary epidemics requires contemporary methods. Lavoipierre notes the "two-pronged" approach of modern medical practice. A general level of diagnosis and some treatment, and a specialized level involving advanced treatments. The specialized level takes place in the hospitals via specialist physicians while the first is the domain of the general practitioner. [2] Due to the pervasive possession of medical insurance, the modern person can easily afford a visit to a general practitioner. Early diagnosis of pathology is common in the modern world. Though, such ease of access does create systematic abuse by patients with

minor problems or patients with chronic hypochondria. Consequently, the modern general practitioner “spends less time with each patient in order to service everyone knocking on the surgery’s door.” [2]

Lavoipierre suggests that the largest problem in modern medical care is that “care and prevention – run in parallel, somewhat ignoring each other.” [2] He comments that this is contrary to what might be expected of the close relationship between an individual and their GP, who might be more prepared to offer preventative services. The reason for this problem is the training medical students undergo. Lavoipierre identifies the modern medical student’s access to such learning tools as “color ultrasound, computerized tomographic scanning, magnetic resonance imaging or radio” yet he associates this with the problem. [2] Much of the “prevalent pathology” he argues are caused by lifestyle factors that are not included in the seemingly comprehensive training curricula. [2] Lavoipierre further equates the divergence in care and prevention to the lack of medical education in acquiring good communication skills to be utilized in doctor-patient relationships.

Preventative medicine is currently what’s “fashionable”, and though many professionals working within modern medical care might wish to incorporate the preventative side of medicine, “the system is not geared [in] helping patients handle their fears and anxieties” regarding negative lifestyle behaviors and environmental factors. [2]

There are some benefits to modern healthcare. Medical procedure in the modern medical world is improved by the decreased cost and simplicity of “laboratory investigations and preventative therapies”. This allows for improved quality of diagnosis in present day, even if many professionals may over-rely on an overly comprehensive number of laboratory tests. Lavoipierre remarks that the modern community bears the cost of the excessive testing, whereas in earlier decades (i.e. 1960s), “careful interrogation, history taking, and clinical examination” were a more common—and probably more personal—practice. [2] However, the high amount of testing can be attributed to the higher number of malpractice lawsuits when physician intervention does not go correctly. Lavoipierre mentions that such a tendency in the system causes an added cost of healthcare delivery, a

necessity for expensive malpractice insurance premiums, and an over-prescribing of antibiotics. [2]

Past periods of human history allowed for a stronger cultural influence on healthcare. But as such spirituality is waning, the modern medical world is slowly becoming more devoid of superstition. As Healthcare professionals Joyce Giger and Ruth Davidhizar stress in their article "Cultural beliefs: The effect on care", "Cultural health practices may be efficacious, neutral, or dysfunctional. Healthcare professionals must be able to sort beliefs into these three categories and assist patients in identifying habits that may be dangerous." [4]

Despite the advantages and hindrances of the modern medical world, contemporary healthcare is changing. And in this changing scene, patient and caregiver alike will face new benefits as well as new challenges. According to Neil Ungerleider (Los Angeles-based reporter for Fast Company), the ten greatest challenges for modern medicine are:

- Wellness programs for the general public
- A shortage of caregivers
- The role of the patient in his or her own care
- The obesity crisis
- Achieving medical innovation
- Managing chronic diseases
- Medical communication
- Reducing childhood obesity
- Making prevention popular
- End of life care

Ungerleider presents an extensive list, yet advancing technology is changing modern medicine. Population science will address the disconnect between public health and personal health. As Medical Doctor and Health Editor for U.S. News & World Report, Bernadine Healy, M.D. notes, "Epidemiology and biostatistics offer a kind of macroscope that complements the microscope and theoscope in assessing environmental and biological factors that underlie individual diseases." [6] Healy also comments on the capability of the electronic medical record in the

contemporary medical world. She affirms, "it will make information more available, more accessible, and more accurate." [6] Certainly, Information Technology will make extensive changes in medicine. Changes that, Healy argues, "should make medicine better and safer." [6]

In addition to the effects of the Information Age, changes in the dynamic of the healthcare industry will alter the ways in which care is provided. Nurse Joan Spitrey identifies one source of the changing dynamic: "patient satisfaction of a hospital [now] has some weight...[and] reimbursement is tied to good care – both actualized and perceived." [7] In addition, the "Healthcare marketplace" is becoming competitive and Spitrey imparts that "patients can now see actual data on hospitals." [7] This data is not necessarily presented "by" the healthcare providers, as the healthcare community has been slow to respond to social networking—the modern place for professional networking. It seems, at least according to Spitrey, that healthcare organizations must take advantage of the contemporary social network or be left behind in the existing world.

Most significant in the modern world's alteration of medical care is the gradual change in the medical world to becoming a business-oriented world. NorthShore University HealthSystem Medical Doctor, Westby G. Fisher poses, "Will our medical students be better served to learn more medicine, or should they be shifting their focus to business in an effort to forward themselves? Who will doctors find themselves serving more, their patients or their employers?" [8] As larger businesses implement larger contracts and arbitrate bigger deals, smaller hospitals as well as independent doctors' offices are finding difficulty due to "cuts to Medicare payments." [8]

The modern era is quickly altering the state of medicine in the healthcare industry. Current postulation would pose that the modern doctor must respond well to the Information Age by not becoming "isolated from [his or her] peers", and—according to Fisher, "stratting [the financial benefit to a hospital system and a patient's best personal interest] will be the doctor's greatest challenge for all doctors going forward." [8] There is much else the modern physician must prepare for, some is certain yet some will not be so evident. Though it is clear that the effects

of this age will transform the physician with the same magnitude as that of philosophies of Ancient Greece and the academies of the Renaissance.

Chapter 12 Bibliography

- [1] Matt Novak, (author of Paleofuture Blog), "The Episode Where George Jetson Rages Against the Machine",
(<http://www.smithsonianmag.com/history/the-episode-where-george-jetson-rages-against-the-machine-146315456/>)
- [2] Guy J. Lavoipierre (Former Epidemiologist, World Health Organization, Geneva, Switzerland), "Modern Medical Practices: A Commentary",
(<http://www.eolss.net/sample-chapters/c03/e6-59-01-01.pdf>)
- [3] Neil Ungerleider (Los Angeles-based reporter for Fast Company), "The 10 Greatest Challenges for Modern Medicine",
(<http://www.fastcoexist.com/1679684/the-10-greatest-challenges-for-modern-medicine>)
- [4] Joyce Newman Giger, Ruth Davidhizar (Both Healthcare professionals), Cultural beliefs: The effect on care,
(<http://www.modernmedicine.com/modern-medicine/content/cultural-beliefs-effect-care>)
- [5] Frederick G. Kilgour (Librarian), "Modern Medicine in Historical Perspective",
(<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC197776/pdf/mlab00190-0069.pdf>)
- [6] Bernadine Healy, M.D. (Medical Doctor, Health Editor for U.S. News & World Report), "How Technology is Changing the Medical Profession"
(<http://www.usnews.com/education/articles/2009/04/22/how-technology-is-changing-the-medical-profession>)
- [7] Joan Spitrey (RN, clinical nursing instructor), "The medical world is changing – How can we keep up?",
(<http://exclusive.multibriefs.com/content/the-medical-world-is-changing-how-can-we-keep-up>)
- [8] Westby G. Fisher, MD, (Medical Doctor, NorthShore University HealthSystem), "The medical field is a-changin' – should how we teach doctors change, too?", (<http://medcitynews.com/2011/12/the-medical-field-is-a-changin-should-how-we-teach-doctors-change-too/?rf=1>)

Chapter 13. The Modern Doctor.

Few other professions with as rich of a history as the physician are experiencing such a shift in paradigm today. The modern doctor “is as much of a super hero or science fiction character as friendly sawbones. The “utility belt” of tools at a modern doctor’s disposal includes surgical lasers and robots, high-powered magnetic imagers and networked data streams.” [2] But amid the advancing technologies that provide a, shall I say, science fiction-esque working environment to the modern doctor, lies a growing bureaucratic sector in a changing healthcare society whose technological momentum might find many doctors unfulfilled and obsolete.

The modern doctor is a personality; he or she “can do anything”. [10] In her article, “Doctors in the Media” part of H&P The Stanford Medical Student Clinical Journal (The Role of the Physician in Society), she cites Dr. Ben Gideon’s address of a class of medical students, describing a doctor:

A doctor never expresses anger, plays favorites, inspires false hopes or unnecessary doubts. When you are feeling harried, exhausted, insulted, conflicted, turned on, put upon, pulled at, taken advantage of, or panicked—keep it to yourself. This is what patients want, and have a right to expect: Someone on their side, fighting for them, a human being, without unkind feelings, who makes no mistakes. [10]

Goldsmith argues that the goal is perfection and the media exacerbates the societal expectations placed on the physician: “This ‘can-do’ attitude is brought to a whole new level on the television screen,” [10] even to a level that brings disappointment to patients when they meet real-world physicians.

"Historically, physicians have generally been portrayed in a positive manner by the media" concurrent with their overall positive-approval. [10] Nowadays, "physicians on television are beginning to be portrayed in a more negative light with 'unflattering personal traits, including adultery, arrogance, and avarice.'" [10] Television doctors such as Dr. Gregory House, Dr. Sean McNamara, and Dr. Christian Troy, represent a "backlash" against the recent changes in medicine. Doctors do not have full control in medical decision-making and also thus, "do not always have the answer". Despite the media giving the viewer a glimpse of "icons, big pharma, potential medical mishaps, overachievers, and heroes" and perpetuating the idea that "doctors can be and do everything" [10], a sector of the media is expressing the more human side of the modern doctor.

More influential than their presence in the media is their presence in society. The modern physician's healthcare experience, medical skill, and societal status almost "force" him or her a role in the policymaking process. Many doctors are asked to speak on behalf of healthcare groups and to help politicians make informed decisions in regards to public health. We know doctors' statements to have been influential in regards to the ill effects of smoking. According to Philippa Soskin in his article "Doctors as Policymakers" (as part of H&P The Stanford Medical Student Clinical Journal (The Role of the Physician in Society)), "The M.D. still garners respect, and with respect comes influence." [10] Such influence even exists at a superficial level. When in public they are "urged [us] to wear [their] white coats." [11] The modern doctor certainly possesses an outward status similar to that of a politician. However, their proficiency as a policymaker that a normal politician does not possess comes from their non-replicable experience in the field.

The modern doctor is a researcher as well as a clinician. A doctor "must continuously read and evaluate the literature, discuss it with colleagues, and formulate opinions that impact our practice." [12] Michael Bokoch points out in his article "Doctors as Scientists" (as part of H&P The Stanford Medical Student Clinical Journal (The Role of the Physician in Society)) that as a scientist, a physician serves two purposes: (1) bringing science to their patients, and (2) bringing medicine to the scientists.

Thus, the modern doctor becomes a liaison between the world of scientific literature and the world of patients. But it is in more ways that the physician scientist is different from other scientists. He is different in the range possessed, his "functional breadth of knowledge" [12] becoming better able to understand the diseases being researched and able to be comfortable speaking the language of varying academic disciplines.

Bokoch believes "doctoring makes one a better scientist." [12] One may question whether it is better for the busy modern doctor to focus on either clinical practice or research. Bokoch argues "medicine and science are inseparably intertwined." [12]

The doctor has always written as a scientist, but the modern doctor writes non-scientific as well. Alana Frost, in her article "Doctors as Writers" (as part of H&P The Stanford Medical Student Clinical Journal (The Role of the Physician in Society)), confirms that contribution to medical science literature as always been of importance to physicians: "The focus on the medical literature stems from a common belief that contributing to and reading the major journals, such as the Journal of the American Medical Association and the New England Journal of Medicine, will make us better doctors." [13] However, she believes that over focus on "RCTS, case studies, and meta-analyses" causes doctors to only view writing as possible through the scientific lens.

Though many physicians have actually begun pursuing non-scientific writing. [13] Such writing usually takes a more personal form; personal narration and memoir are popular. Such modern writings display the imperfections of the physician who is otherwise "infallible and omniscient". [13]

Though current doctors have the time to write more freely, medical students have less time to write/study non-core-science focused areas. In medical school, Frost notes that "little time is devoted to the study of the humanities, which many believe helps students and physicians develop insights into the human condition." [13] Such limited curriculum would point to a future medical professional lacking human empathy, one that is as "human-less" as the advanced technological machines he or she operates.

However, more medical schools are gradually requiring humanities core study. Learning such will not only help patient empathetic relation and writing, but may also “improve the clarity of their professional, scientific writing.” [13] Maybe the modern doctor will work in the future to pursue multiple-disciplines. Such is reminiscent of a return to a “Renaissance Man” or an “Ancient Greek Physician-Scholar”.

Despite living with the benefits of a modern academic professional, constraints of corporate constructions limit the physician. Doctor Sandeep Jauhar states in his article that “in the past four decades, American doctors have lost the status they used to enjoy.” [4] In turn, “medicine is just another profession” [4] and these losses are causing some doctors to slowly reduce the number of patients they are seeing; some even stop practicing.

This is not good for anyone involved in healthcare, the giving or receiving end. Negative morale of doctors will, of course, affect patients—negatively. Such is already apparent in teaching and education.

A large problem is that the modern doctor is affected by a bureaucracy of a system that requires unnecessary actions against his or her better judgment. Often, shotgunning multitudes of unnecessary medical tests can feel like working as merely a pawn for moneymaking hospital administrators. Doctors feel they don't have enough time to spend with patients, yet spend more time on insurance company paperwork. [4] Unfortunately, for a profession with such a history of interpersonal connectedness, the modern doctor is less connected to his/her patient's lives. [4]

Nonetheless, the modern doctor is learning to adapt to the changing contemporary medical world. And where the doctor is not adapting, the healthcare world adjusts to meet the boundary.

According to Bangalore and Framingham, in their article “Squeezing out the doctor”, a rising healthcare demand is not being met by the number of doctors. The doctor is losing his majority presence in healthcare. Other healthcare professions are rising with “technology filling gaps in the labour force.” [8] Bangalore and Framingham argue, “for one thing, to treat the 21st century's problems with a 20th-

century approach to health care would require an impossible number of doctors.” [8] The low number of doctors means the modern doctor is becoming “much less central to health care”. [8] Even Soskin agrees, “A challenge facing physicians in the policy arena is that they are no longer the dominant voice in health care.” [11] This leads to a “dilution of physician influence”. [11]

The growing scarcity of doctors is forcing the rise of other healthcare professions and a multitude of programs to deal with the demands of medical problems. While some may help assist the doctor in his noble endeavors, others may detract from his being essential. “Systematic” technology works to manage chronic conditions, so doctors do not necessarily have to. In fact, according to Bangalore and Framingham, “Patients are much happier to monitor themselves at home with gadgets bought online than they used to be”. [8] These programs actually allow better managing of chronic conditions (of which doctors have always had difficulty).

In some areas of healthcare, doctors actually are less preferable to non-doctors. And some studies have found some patient satisfaction higher in those treated by nurses than doctors. [8] In fact, Bangalore and Framingham share that “America has led the world in developing the roles of nurse practitioners and physician assistants.” [8] “Physician assistants in America can do about 85% of the work of a general practitioner, according to James Cawley of George Washington University.” [8] But the doctor is the last one to want to lose his professional prestige. They may need not worry, as often “any change will first require swaying the doctors” [8] and some countries, actually, have opposed the creation and propagation of nurse practitioner and physician assistant careers.

The largest change to contemporary medicine is the rising bureaucracy in the healthcare world. According to Soskin: “Managed care, government programs, third party payers, utilization reviews, drug formularies, and malpractice laws are among the many changes in recent decades that affect the way physicians practice medicine.” [11]

The Era of Health Maintenance Organizations beginning in 1970 led to the bureaucracy prominent today. These HMOs “promote a new kind of health-care

delivery built around price controls and fixed payments.” [4] They include patient cost-sharing and insurance reviews of medical services.

Jauhar believes that “most doctors continue to want to be like the physician knights of the golden age of medicine [but] the American system too often seems to promote knavery over knighthood.” [4] He argues: “American doctors need an internal compass to navigate the changing landscape of our profession.” [4]

With the changes in modern healthcare, what might be the place in future society for today’s physician? What might that place be in the far future?

Due to the loss of a dominant voice in health care, doctors may be forced to become more specialized as healthcare programs and other healthcare careers fill the more general roles. In addition, today’s “physicians align with specialty-specific organizations and diverge on contentious policy issues such as universal health care.” [3]

The future doctor will find ways to fill the fulfillment gaps left by the modern healthcare bureaucracy. Jauhar believes “the challenge in dealing with physician burnout on a practical level is to create new incentive schemes to foster that meaning,” like publicizing achievement or rewarding based upon patient satisfaction. [4]

Ultimately, most doctors still seem to care, utmost, about the patient. [4] Jauhar argues: “I believe this is the key to coping with the stresses of contemporary medicine: identifying what is important to you, what you believe in and what you will fight for.” [4] He trusts that the “human moments” experienced by the physician are the most envied by other professions, and that those will keep the profession fulfilling. But in a technologically advancing world, how long will the “human side” of medicine last?

To meet the constant need for the scarce number of doctors, many sources point to telemedicine and telesurgery. Author Matt Novak references the predictions of Hugo Gernsback in his article “Telemedicine Predicted in 1925”. Such predictions are fairly precise of today’s advancing telemedicine:

The busy doctor, fifty years hence, will not be able to visit his patients as he does now. It takes too much time, and he can only, at best, see a limited number today. Whereas the services of a really big doctor are so important that he should never have to leave his office; on the other hand, his patients cannot always come to him. This is where the teledactyl and diagnosis by radio comes in. [1]

Jauhar affirms that modern “technology does not just allow diagnosis at a distance—it allows surgery at a distance, too” [8] and “As yet they are enhancements for surgeons more than they are replacements, but that may change in time.” [8]

Many of the doctor characters in science fiction complement the contemporary doctor and represent a possible future of the career. As far as the near-future Dr. Simon Tam acts as a modern doctor. He carries himself with the knowledge and elite prestige of today’s physician and is adept in the use of advanced medical tools. Dr. Tam is able to exist symbiotically with a ship captain that makes decisions that largely affect him, and able to limit the quantity of his patient interaction, while increasing its quality when he’s able. This is seen in his interaction with his sister River.

An example that complements the far-future of the real-world doctor would be the EMH Doctor. He possesses the personality that might be programmed to a real-world medical AI. The Fahrenheit 451 doctors are ideally what a modern doctor might act like as a doctor-technician devoid of social rapport. An interesting example, Doc (*Logan’s Run*) operates on his patients via a terminal. Such practice looks identical to modern or future telemedicine/telesurgery.

Not all of the major science fiction character archetypes complement the contemporary doctor. While Archetype 1 might fit the modern doctor, Archetype 3 is truly the only valid Archetype that can be associated with the future of the career. Some modern physicians might live as the multi-disciplinarian. True, it is a trait that is embodied by an Archetype 2 doctor. However, too many differences exist in

regards to knowledge, equipment, resources, and environment to make Archetype 2 a compelling representation. Of the Archetypes, the real-world future physician is, indeed becoming an Archetype 3 doctor.

The modern doctor is a personality, a policymaker, a scientist, and a writer. Though society would like to hold this profession in high prestige and view the people who take it up as role models, many of the ills of the contemporary world act as a detriment to the profession. The medical doctor must adapt to the changing contemporary medical world that includes the rise of other health care professionals, increased capability of technologies, an increasing extensive patient demand, and a rising bureaucracy within the hospital. These changes affect the modern doctor in a variety of ways. The modern doctor is losing their dominant position, losing fulfillment in their career, and must use new, impersonal technologies to meet patient demand. Several characters in science fiction film can serve as examples that represent this changing profession and the future profession to which it will progress. Most examples are that of Archetype 3, meaning the modern doctor, in attempting to keep up with the changing nature of modern society, is becoming a *doctor-technician*.

Chapter 13 Bibliography

- [1] Matt Novak (author of Paleofuture blog), Telemedicine Predicted in 1925, (<http://www.smithsonianmag.com/history/telemedicine-predicted-in-1925-124140942/?no-ist>)
- [2] Ryan Winter (); The History of Physicians/Doctors, (<http://blog.soliant.com/careers-in-healthcare/the-history-of-physicians-doctors/>)
- [3] The Self-Pay Patient, "Growing bureaucracy in American medicine", (<http://selfpaypatient.com/2014/03/10/growing-bureaucracy-in-american-medicine/>)
- [4] Sandeep Jauhar, "Why Doctors Are Sick of Their Profession", (<http://www.wsj.com/articles/the-u-s-s-ailing-medical-system-a-doctors-perspective-1409325361>)

- [5] Royal College of Physicians, "Doctors in society: medical professionalism in a changing world", (<http://shop.rcplondon.ac.uk/products/doctors-in-society-medical-professionalism-in-a-changing-world?variant=6337443013>)
- [6] Richard Horton (Physician and editor of *The Lancet*), "What's wrong with Doctors", (<http://www.nybooks.com/articles/2007/05/31/whats-wrong-with-doctors/>) (Not sure if correct author and title)
- [7] Drew Hendricks (Tech writer), "How Technology Is Changing the Medical and Health Care Field", (http://www.huffingtonpost.com/drew-hendricks/how-technology-is-changin_b_3273542.html)
- [8] Bangalore and Framingham, "Squeezing out the doctor", (<http://www.economist.com/node/21556227>)
- [9] Futuristgerd.com, "The Future of Medicine: Squeezing out the Doctor? (The Economist) Me: or... setting doctors free?", (<http://www.futuristgerd.com/2013/04/29/the-future-of-medicine-squeezing-out-the-doctor-the-economist/#>)
- [10] Lizzy Goldsmith, "The Role of the Physician in Society: Doctors in the Media", (https://med.stanford.edu/content/dam/sm/bioethics/documents/arts/H%26P_journals/Summer07PDR.pdf)
- [11] Philippa Soskin, "The Role of the Physician in Society: Doctors as Policymakers", (https://med.stanford.edu/content/dam/sm/bioethics/documents/arts/H%26P_journals/Summer07PDR.pdf)
- [12] Michael Bokoch, "The Role of the Physician in Society: Doctors as Scientists", (https://med.stanford.edu/content/dam/sm/bioethics/documents/arts/H%26P_journals/Summer07PDR.pdf)
- [13] Alana Frost, "The Role of the Physician in Society: Doctors as Writers", (https://med.stanford.edu/content/dam/sm/bioethics/documents/arts/H%26P_journals/Summer07PDR.pdf)

Chapter 14. Concluding Argument.

This thesis has so far examined science fiction as a genre, science fiction physician characters, medicine and its history in the world, and the evolution of the physician profession throughout the history of mankind. It has determined trends in form and function within each, found associations between them, and presented “data” to allow extrapolation into the future of human history. At this point the thesis will work to provide closure to any unresolved questions or discussions. A major, final point will be made with regard to the intent of my thesis and an educated inference made as to the most “correct” view of the future physician as seen in science fiction film.

Currently, no additional categorizations suggest themselves that are large enough to form additional archetypes into which to place the physician characters present in science fiction film. The major archetypes presented are not mutually exclusive, nor do they holistically define a character if a character fits into one of the archetypes. A physician character may fit one, but some fit more tightly than others. Thus, the archetypes are there only as observations of trends, a physician character does not necessarily need to belong to one.

Nevertheless, more archetypes might arise as science fiction continues as a film genre and as the current world we live in advances technologically and culturally. As evident in its history, science fiction does not seem to be a genre to lose subgenres or features. It has always “added” them into its repertoire, using them intensely at initial inception, then using them moderately, indefinitely. This is inherent in a genre that typically deals with possible futures—or pasts. Part of the sustainability of science fiction as a genre is that they do not throw out the old in favor of the new. Such new archetypes may be determined by newly created subgenres within science fiction as well as new science fiction film projective speculation as the future comes to pass.

Society's current medical world and changes in the past few years give some estimation on how the physician profession will endure. Contemporary societal changes in healthcare suggest that medicine will become more of a business. With growing corporate control over hospitals, a larger bureaucratic infrastructure will develop to meet demands placed on the healthcare system by insurance companies, HMOs, the Federal Reserve System, and the government. Eventually, hospitals will come to be run by businessmen as opposed to medical professionals. With the rise in healthcare management, nurses, and physician's assistants, the medical doctor will lose much of his/her decision-making power in the healthcare workplace. In addition, the increase in bureaucratic system will limit the ability of doctors to adequately consult in-person with their patients.

Science fiction film gives it's own interpretation of how the medical world will be different in the future. Though each work of science fiction proposes it's own future for their physician characters, the tendencies seen in their conglomerated production are what allow us to extrapolate how science fiction says, as a genre, the physician profession will exist in the future. Such a trend is in fact present over time. We see more Archetype 3 physician characters being presented than necessarily Archetype 1 or Archetype 2 physicians. This increasing proportionality in science fiction film postulates to the existence of an Archetype 3 doctor as the likely form of the physician career in the future.

Society's current state and change are somewhat limited in only being able to infer the near future, while science fiction tends to predict into the further future (as is by definition of the genre of entertainment). Nonetheless, both predictions of the future doctor profession could possibly exist concurrently, as the science fiction far-future prediction can easily be seen to result from the near-future conjectures of the contemporary world. Both tend to converge on the idea that the diagnostician element will have decreased and the human caretaking element may fall short in consequence.

Both the changing medical world and the various depictions of the physician in science fiction film, indicate a technician-type career being forced to surface. The science fiction character Archetype 3 *Doctor turned Technician* embodies such a

profession. Many doctors will fight to keep the decision-making element, yet more may have luck attempting to maintain that human element. Medicine has always held three properties which define those who aspire to the profession: For its doctors, medicine fulfills (1) Power (Decision-making), (2) Caretaking, and (3) wealth. As the decision-making element wanes first, those who are attracted to medical schools will begin to be those able to be personally fulfilled by only the caretaking and the wealth aspects. In the much further future, medicine will be made up of 1984-esque "handymen" soon to be Star Wars Droid doctors or Elysium/Prometheus machines. Another possibility for the far future is that healthcare will consist of technicians striving to regain that human element. These doctors may attempt to fill the gap left by the decision-making component with additional caretaking work, similar to the EMH Doctor, or even Baymax. The largest piece of "evidence" in extrapolating the far future has been the series *Star Trek*. Such trends presented in the evolution of the Chief Medical Officer form the perfect compliment and overall generalization of the projective speculation presented by science fiction film as a whole.

At first, doctor-technicians working in the future of healthcare do not sound pleasant. Which is the most desirable archetype? While each present traits that are forthright positive or negative, the fact that each have their advantages and disadvantages mean an archetype can not realistically be defined as "good" or "bad". While the presence an Archetype 1 doctor sounds pleasing, this archetype suffers from being the least plausible of the three to exist in the future. Archetype 2 Mystic-doctors possess the human element lacking in the doctor-technicians. Their ability for human empathy and their multi-disciplinary education make them a more-than-competent healthcare provider in the future of humanity. However, when life is on the line, there are not many who would trade the quick and complete medical care associated with a machine for the human empathy associated with an organic smile. Thus, the Archetype 3 doctor-technician may actually be the most desirable. The most favorable outcome proves to be a product of the priority placed on the result rather than the journey. Nevertheless, if future doctor-technicians look to improve

the journey (as is the case with the EMH Doctor and many others), patients are not likely to complain.

Following examination of the realms of medicine and science fiction has largely benefited this thesis in its speculative ability. As the current major archetypes are sizeable generalizations, no additional classifications at that level are at all noticeable, though some may exist within the deeper and more specific subgenres. Yet still, additional archetypes may arise in the future as the already-rich genre of science fiction continues to develop and as more subgenres within the fiction emerge. Society and contemporary changes in medicine indicate the doctor profession will progressively become devoid of a decision-making component and may start to lose its caretaking element. Science fiction implies that the far future will exhibit such ample medical knowledge that doctors are reduced in their diagnostician ability and become no more than dissonant Archetype 3 technicians operating medical machinery. Both contemporary medical society and science fiction suggest the same outcome, with only science fiction's projection taking place in sequence after the indications of modern day medicine. Thus, the appropriate view of a future physician will most likely be a doctor who begins to lose his decision-making component yet sees an increase in his caretaking work, following which even the empathy-fueled caretaking work may decline—an Archetype 3 *Doctor turned Technician*. Yet, as seen in many films and the wants of current physicians, this *technician*-physician may aspire to return the human element to their profession. The future will tell what might become of history's revered healer.

Chapter 15. Conclusion.

The characters and narratives within a work of fiction are imaginative reflections of the reality in which we exist. Science fiction, thus, presents a prognosis of the future reality in which we will exist. Much differs in these works of science fiction. The ways in which its characters interact, communicate, traverse the world, experience different forms of entertainment, eat, work, combat one another, and maintain their health, have all been affected by technological and societal advances that could indeed be reality in years to come. Consequently, science fiction serves as a form of futurology. Extrapolations about the future can be made from current scientific knowledge, as well as the creative minds of visionary writers. By analyzing science fiction, we can better understand these futurological predictions. This thesis examined the role of the physician as a character in science fiction film along with knowledge of the changing contemporary medical world in order to hypothesize what the future real-world physician career will be like.

The intent of this thesis was to observe the role played by the science fiction physician character in film as a professional medical doctor and as an element of the narrative with whom the other characters interact. By doing such, tendencies in the portrayal of the character over time were investigated. A system of major archetype classification was constructed. With knowledge of the immediate technological and professional changes to the healthcare world, the science fiction films were critiqued upon their extrapolation of a plausible and sustainable prediction of the place of the medical profession in the future of human civilization.

This thesis offered research and inquiry that subsists as a connection between the arts and the sciences. It offered a critique and in-depth analysis of many characters from mainstream science fiction as well as many science fiction subgenres. It explored the ability of a simple facet of a fictional narrative as a means of world building and futurism. Moreover, the thesis offered scrutiny on the current state of the healthcare industry, as well as commentary of the medical doctor's

changing domain within. In addition, the work provides examples of developing fields of technology as well as illustrations of themes related to human society and social interaction that offer insight to those of many disciplinary fields. Such a target audience includes more than just those within healthcare or literature, but those within the humanities and technological world as well.

This thesis project first began by identifying science fiction as a source of futurology that contains many examples of accurate prediction of technological and societal advancement. The thesis then examined its rich history, finding its past to give credence as a valid form of entertainment in which to analyze such a subject.

Medicine and the medical doctor were found to exist in science fiction in a variety of forms. There are commonalities between the films, and thus Archetypal categorization was able to be drawn. In this thesis namely, Archetype 1: *The Same-era doctor with new equipment*, Archetype 2: *The Doctor returned to Mysticism*, and Archetype 3: *The Doctor turned to Technician*.

The thesis studied Medical history as a means to better understand the physician profession. Research brought the understanding that Medical history in our world retains copious examples of development of technologies available today and examples of the evolution of the professions that utilize them. The role of the physician was recognized to be one that has changed over time in proficiency and specificity alongside the progression of specialized scientific knowledge and the compartmentalization of society.

Analysis of contemporary healthcare allowed for the use of modern societal circumstance to be utilized in future extrapolation of which science fiction films presented not only a sustainable, but also a plausible future of the medical profession with respect to modern times. The changing contemporary medical world presented a near future where the presence of the decision-making component and the caretaking component of medical doctor's profession is questionable. Thus, it seems that the near future will have doctors with little decision-making power, who must find themselves professionally fulfilled with only the wealth and slowly-waning human element that comes with the profession.

Science fiction films were then used to make inferences on the future of humanity. Plausible Science fiction films can extrapolate a further future of medical doctors in which the advancement of medical scientific knowledge has removed the diagnostician and the caretaker from the physician, leaving only a technician behind. Though as we have found, such a technician may strive to regain that lost human element, there are many other possible paths the profession could take. Nonetheless, it was found that both real-world and fictional conjectures complement one another.

Completing this thesis has been beneficial to my educational experience as an Honors and Chemistry student. I wished to complete this project as both the medical world and science fiction genre have been intriguing to me throughout my life. Indeed, this thesis has given me a better understanding of the medical doctor profession and the changes that are taking place today, giving me better judgment in pursuing this field for my future career. It expanded my knowledge of chemistry to include the applications into real-world developing technologies. As an Honors student, an in-depth analysis of a genre of fiction provided me with the knowledge of what really defines a genre, as well as how a specific subset of authors “think”.

The work accomplished in this thesis does not necessarily end with the conclusions presented; there are many areas in which the work can be extended. Examination and extrapolation like in this thesis can be utilized for other professions in science fiction. Law professionals, politicians, military personnel, engineers, media professionals, teachers, chefs, law enforcement, custodial employment, artists, musicians are all present in science fiction worlds and there most likely exist propensities in their form and function.

Science fiction will continue to develop as a genre. And such changes it makes over time potentially allow for new inferences to be made. A large number of superhero movies have been present in the last decade and a half (if you count superhero movies as science fiction). Audiences may see many more before growing weary of this variety. There has also been a recent rush of Young Adult dystopian novels. Though it has not been large enough to truly be a classic science fiction “boom before a moderation”. A larger presence of these films would give projection

into post-apocalyptic or far-future settings. science fiction has started to produce more “accurate” near-future modern science fiction adventures. Such films like *Gravity*, *Interstellar*, and *The Martian* have shown more advanced themes in styles reminiscent of Kubrick’s *2001* (yet of course, no where near in comparison in scale.) These more scientifically accurate films have potentially the highest aptitude in futurological prediction. However, many are limited to near-future settings for scientific accuracy. The future may show more of these films on the rise amongst the others. All in all, science fiction will continue as a genre that spawns many subgenres that rise and moderate, increasing the scope and richness of the entire genre.

Yet just as film can be used for extrapolation, so can other forms of art and other productions. Though extrapolation into the future would be reserved for those forms of art presenting the future, extrapolation into other areas of human life and the human condition can be possible in works that represent the present. Literature is a common form for this practice. Any music or visual art may have possible application if it yields some course of a narrative element. Even video games may be reasonable modes of prediction. Not just a form of gratuitous entertainment anymore, they are becoming a growing genre in that they teach and exhibit the humanities almost to the level of a film or television series.

The work conducted in this thesis can also be continued simply via more research into more science fiction films and the analysis of more propensities for physician characters. In addition, as time not only allows for the production of more science fiction films, but also brings us into the future, there will be a new future in which to extrapolate the role of the physician. The films presented in ten—or even five—years, may start to exhibit new themes for the physician character. These new ideas from new writers will reflect the new contemporary societal views and provide additional speculation for the role of the revered doctor within the future of human society.

Bibliography.

Chapter 2 Bibliography

- [1] The Economist, "The rights and wrongs of science fiction", (<http://www.economist.com/node/7040304>)
- [2] Sci Fi Film History, "<Home Page>", (<http://www.scifilmhistory.com/index.php>)
- [3] Sci Fi Film History, "Origins of science fiction", (<http://www.scifilmhistory.com/index.php?pageID=DefBack>)
- [4] Alfredo Suppia, "SF as Film Genre (1895-1960s)", (<http://virtual-sf.com/wp-content/uploads/2012/04/Suppia.pdf>)
- [5] Bradbury, Ray. *Fahrenheit 451*. New York: Simon & Schuster, 2012. Print.
- [6] Paul Croke (former newspaper editor, freelance writer, writes about consumer technology), "Science fiction predictions are surprisingly accurate", (<http://baltimorepostexaminer.com/science-fiction-predictions-surprisingly-accurate/2015/01/14>)

Chapter 3 Bibliography

- [1] Simon Carter, "Doctors in Popular Fiction: 'He's dead, Jim' – medicine in science fiction #2", (<http://guerillawire.org/politics/doctors-in-popular-fiction-hes-dead-jim-medicine-in-science-fiction-2/>)
- [2] Brett S. Stifflemire, "Physicians, Society, and the science fiction Genre in the Film Versions of Invasion of the Body Snatchers: or Doctors with a Serious Pod Complex", (<http://scholarsarchive.byu.edu/cgi/viewcontent.cgi?article=3267&context=etd>)
- [3] Brian Merchant (Senior Editor at Motherboard), "Fixed in a Flash: The Utopian Future of Health Care, as Seen in science fiction", (<http://motherboard.vice.com/read/the-utopian-future-of-medicine>)
- [4] Matt Novak, (Author of Paleofuture Blog), "The Episode Where George Jetson Rages Against the Machine", (<http://www.smithsonianmag.com/history/the-episode-where-george-jetson-rages-against-the-machine-146315456/?no-ist>)
- [5] Jonathan Kim (Film critic for ReThink Reviews), "ReThink Review: *Robot & Frank* – High-Tech Golden Years", (http://www.huffingtonpost.com/jonathan-kim/robot-and-frank-review_b_1822837.html)
- [6] ([Adapted from "You and Your Characters" by James Patrick Kelly: <http://www.sfwawriting.org/writing/character.htm>]), "English 250 Fiction Unit: Characterization 1 – Character Types" (<http://www.ohio.edu/people/hartleyg/ref/fiction/character1.html>)

- [7] Memory Alpha (Star Trek) Wikia, "The Doctor", (http://memory-alpha.wikia.com/wiki/The_Doctor)
- [8] The Disney Wikia, "Baymax", (<http://disney.wikia.com/wiki/Baymax>)
- [9] Sandeep Jauhar, "Why Doctors Are Sick of Their Profession", (<http://www.wsj.com/articles/the-u-s-s-ailing-medical-system-a-doctors-perspective-1409325361>)

Chapter 4 Bibliography

- [1] Simon Carter, "Doctors in Popular Fiction: 'He's dead, Jim' – medicine in science fiction #2", (<http://guerillawire.org/politics/doctors-in-popular-fiction-hes-dead-jim-medicine-in-science-fiction-2/>)
- [2] Memory Alpha Wiki, (Star Trek Wiki), "Dr. Leonard McCoy" (http://memory-alpha.wikia.com/wiki/Leonard_McCoy)
- [3] Memory Alpha Wiki, (Star Trek Wiki), "Beverly Crusher", (http://memory-alpha.wikia.com/wiki/Beverly_Crusher)
- [4] Memory Alpha Wiki, (Star Trek Wiki), "Julian Bashir", (http://memory-alpha.wikia.com/wiki/Julian_Bashir)
- [5] Memory Alpha (Star Trek) Wikia, "The Doctor", (http://memory-alpha.wikia.com/wiki/The_Doctor)
- [6] Memory Alpha (Star Trek) Wikia, "Chief medical officer", (http://memory-alpha.wikia.com/wiki/Chief_medical_officer)

Chapter 5 Bibliography

- [1] Medical News Today; A History of Medicine (<http://www.medicalnewstoday.com/info/medicine/>)
 - [1a] Medical News Today; What is Prehistoric Medicine?, (<http://www.medicalnewstoday.com/info/medicine/prehistoric-medicine.php>)
 - [1b] Medical News Today; What is Ancient Egyptian Medicine?, (<http://www.medicalnewstoday.com/info/medicine/ancient-egyptian-medicine.php>)
 - [1c] Medical News Today; What is Ancient Greek Medicine?, (<http://www.medicalnewstoday.com/info/medicine/ancient-greek-medicine.php>)
 - [1d] Medical News Today; What is Ancient Roman Medicine?, (<http://www.medicalnewstoday.com/info/medicine/ancient-roman-medicine.php>)
 - [1e] Medical News Today; What is Medieval Islamic Medicine?, (<http://www.medicalnewstoday.com/info/medicine/medieval-islamic-medicine.php>)
 - [1f] Medical News Today; What is European Medieval & Renaissance Medicine?,

- (<http://www.medicalnewstoday.com/info/medicine/medieval-and-renaissance-medicine.php>)
 - [1g] Medical News Today; What is Modern Medicine?, (<http://www.medicalnewstoday.com/info/medicine/modern-medicine.php>)
- [2] Ancient History Encyclopedia (<http://www.ancient.eu/medicine/>)
- [3] Jan Marsh (author of *The Pre-Raphaelite Sisterhood* (1985) and biographies of Dante Gabriel Rossetti and Christina Rossetti.); *Health & Medicine in the 19th Century*, (<http://www.vam.ac.uk/content/articles/h/health-and-medicine-in-the-19th-century/>)
- [4] Phillip Rhodes (Regional Postgraduate Dean of Medical Studies; Professor of Postgraduate Medical Education, University of Southampton, England, 1980–87. Author of *An Outline History of Medicine* and others.); *History of Medicine*, (<http://www.britannica.com/topic/history-of-medicine/Medicine-in-the-20th-century>)

Chapter 6 Bibliography

- [1] Medical News Today; A History of Medicine (<http://www.medicalnewstoday.com/info/medicine/>)
 - [1a] Medical News Today; What is Prehistoric Medicine, (<http://www.medicalnewstoday.com/info/medicine/prehistoric-medicine.php>)
- [2] Jan Marsh (author of *The Pre-Raphaelite Sisterhood* (1985) and biographies of Dante Gabriel Rossetti and Christina Rossetti.); *Health & Medicine in the 19th Century*, (<http://www.vam.ac.uk/content/articles/h/health-and-medicine-in-the-19th-century/>)
- [3] Ryan Winter (); *The History of Physicians/Doctors*, (<http://blog.soliant.com/careers-in-healthcare/the-history-of-physicians-doctors/>)
- [4] MedlinePlus; Doctor of medicine profession (MD), (<https://www.nlm.nih.gov/medlineplus/ency/article/001936.htm>)
- [5] Arthur Selwyn-Brown, "The Physician Throughout the Ages", [Book on a Website], (<http://babel.hathitrust.org/cgi/pt?id=uc1.31822005029525;view=1up;seq=7>)

Chapter 7 Bibliography

- [1] Steven Johnson (author), "The Science of Eternal Sunshine", (http://www.slate.com/articles/arts/brave_new_world/2004/03/the_science_of_eternal_sunshine.html)
- [2] Catherin Shoard (film Editor, Guardian News and Media), "Robot & Frank: vision of the future?", (<http://www.theguardian.com/film/2013/mar/08/robot-and-frank-vision-future>)

- [3] Charlie Jane Anders (Editor of io9 and author of *All the Birds in the Sky*), "Robot and Frank: science fiction at its Absolute Best", (<http://io9.gizmodo.com/5936626/robot-and-frank-movie-science-fiction-at-its-absolute-best>)
- [4] AMD Telemedicine, "6 ways science fiction has predicted the future of telemedicine", (<http://www.amdtelemedicine.com/blog/article/6-ways-science-fiction-has-predicted-future-telemedicine>)
- [5] Brian Merchant (Senior Editor at Motherboard), "Fixed in a Flash: The Utopian Future of Health Care, as Seen in science fiction", (<http://motherboard.vice.com/read/the-utopian-future-of-medicine>)
- [6] Brad Aiken, MD (Medical Doctor), "The Invasion of Modern Medicine by science fiction or The Search for the Fountain of Youth", (<http://www.bradaiken.com/SF-MedicineArticle.pdf>)
- [7] AMD Telemedicine, "Telemedicine inspiration from a galaxy far, far away", (<http://www.amdtelemedicine.com/blog/article/telemedicine-inspiration-galaxy-far-far-away>)
- [8] Matt Novak (author of Paleofuture blog), "Telemedicine predicted in 1925", (<http://www.smithsonianmag.com/ist/?next=/history/telemedicine-predicted-in-1925-124140942/>)

Chapter 8 Bibliography

- [1] Simon Carter, "Doctors in Popular Fiction: 'He's dead, Jim' – medicine in science fiction #2", (<http://guerillawire.org/politics/doctors-in-popular-fiction-hes-dead-jim-medicine-in-science-fiction-2/>)
- [2] Brett S. Stifflemire, "Physicians, Society, and the science fiction Genre in the Film Versions of Invasion of the Body Snatchers: or Doctors with a Serious Pod Complex", (<http://scholarsarchive.byu.edu/cgi/viewcontent.cgi?article=3267&context=etd>)
- [3] Stratmann, H. G. *Using Medicine in science fiction: The SF Writer's Guide to Human Biology*. Cham: Springer, 2016. Print.
- [4] ([Adapted from "You and Your Characters" by James Patrick Kelly: <http://www.sfwawriting.org/writing/character.htm>]), "English 250 Fiction Unit: Characterization 1 – Character Types" (<http://www.ohio.edu/people/hartleyg/ref/fiction/character1.html>)
- [5] learn.lexiconic.net, "Types of Characters in Fiction", (<http://learn.lexiconic.net/characters.htm>)
- [6] J.J. Jonas, "The Twelve Archetypes", (http://www.uilutexas.org/files/capitalconference/Twelve_Character_Archetypes.pdf)
- [7] Colonel Bell Burr, "The Physician as a Character in Fiction", (https://books.google.com/books?id=6gziAAAAMAAJ&pg=PA2&lpg=PA2&dq=physician+character+in+fiction&source=bl&ots=anvC_TKWIs&sig=9ZC65ykcCdm)

[qNx0jzBAZxQII4V0&hl=en&sa=X&ved=0ahUKEwjM5OrelYjMAhUI4yYKHd60BGcQ6AEIezAH#v=onepage&q=physician%20character%20in%20fiction&f=false](http://www.google.com/search?q=Nx0jzBAZxQII4V0&hl=en&sa=X&ved=0ahUKEwjM5OrelYjMAhUI4yYKHd60BGcQ6AEIezAH#v=onepage&q=physician%20character%20in%20fiction&f=false)

Chapter 9 Bibliography

- [1] Simon Carter, "Doctors in Popular Fiction: 'He's dead, Jim' – medicine in science fiction #2", (<http://guerillawire.org/politics/doctors-in-popular-fiction-hes-dead-jim-medicine-in-science-fiction-2/>)
- [2] Stratmann, H. G. *Using Medicine in science fiction: The SF Writer's Guide to Human Biology*. Cham: Springer, 2016. Print.
- [3] tvtropes.org, "Dr. Feelgood", (<http://tvtropes.org/pmwiki/pmwiki.php/Main/DrFeelgood>)
- [4] tvtropes.org, "The Medic", (<http://tvtropes.org/pmwiki/pmwiki.php/Main/TheMedic>)
- [5] tvtropes.org, "Dr. Jerk", (<http://tvtropes.org/pmwiki/pmwiki.php/Main/DrJerk>)
- [6] tvtropes.org, "M.D. Envy", (<http://tvtropes.org/pmwiki/pmwiki.php/Main/MdEnvy>)

Chapter 10 Bibliography

- [1] Simon Carter, "Doctors in Popular Fiction: 'He's dead, Jim' – medicine in science fiction #2", (<http://guerillawire.org/politics/doctors-in-popular-fiction-hes-dead-jim-medicine-in-science-fiction-2/>)
- [2] Brett S. Stifflemire, "Physicians, Society, and the science fiction Genre in the Film Versions of Invasion of the Body Snatchers: or Doctors with a Serious Pod Complex", (<http://scholarsarchive.byu.edu/cgi/viewcontent.cgi?article=3267&context=etd>)
- [3] Brian Merchant (Senior Editor at Motherboard), "Fixed in a Flash: The Utopian Future of Health Care, as Seen in science fiction", (<http://motherboard.vice.com/read/the-utopian-future-of-medicine>)
- [4] Battlestar Wiki, "Sherman Cottle", (http://en.battlestarwiki.org/wiki/Sherman_Cottle)
- [5] Memory Alpha Wiki, (Star Trek Wiki), "Dr. Leonard McCoy" (http://memory-alpha.wikia.com/wiki/Leonard_McCoy)
- [6] Andrew Mickel (Author, denofgeek.com), "Battlestar Galactica's minor stars: Doc Cottle", (<http://www.denofgeek.com/tv/battlestar-galactica/19340/battlestar-galacticas-minor-stars-doc-cottle>)
- [8] tvtropes.org, "The Medic", (<http://tvtropes.org/pmwiki/pmwiki.php/Main/TheMedic>)
- [9] The Firefly and Serenity Database Wikia, "Simon Tam" (http://firefly.wikia.com/wiki/Simon_Tam)
- [10] tvtropes.org, "The Medic", (<http://tvtropes.org/pmwiki/pmwiki.php/Main/TheMedic>)

- [11] J.J. Jonas, "The Twelve Archetypes",
(http://www.uiltexas.org/files/capitalconference/Twelve_Character_Archetypes.pdf)

Chapter 11 Bibliography

- [1] Dune Wikia, "Suk Medical School",
(http://dune.wikia.com/wiki/Suk_Medical_School)
- [2] Dune Wikia, "Suk Inner School",
(http://dune.wikia.com/wiki/Suk_Inner_School)
- [3] Medical News Today; A History of Medicine
(<http://www.medicalnewstoday.com/info/medicine/>)
 - [3a] Medical News Today; What is Prehistoric Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/prehistoric-medicine.php>)
 - [3b] Medical News Today; What is Ancient Egyptian Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/ancient-egyptian-medicine.php>)
 - [3c] Medical News Today; What is Ancient Greek Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/ancient-greek-medicine.php>)
 - [3d] Medical News Today; What is Ancient Roman Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/ancient-roman-medicine.php>)
 - [3e] Medical News Today; What is Medieval Islamic Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/medieval-islamic-medicine.php>)
 - [3f] Medical News Today; What is European Medieval & Renaissance Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/medieval-and-renaissance-medicine.php>)
 - [3g] Medical News Today; What is Modern Medicine?,
(<http://www.medicalnewstoday.com/info/medicine/modern-medicine.php>)
- [4] Arthur Selwyn-Brown, "The Physician Throughout the Ages", [Book on a Website],
(<http://babel.hathitrust.org/cgi/pt?id=uc1.31822005029525;view=1up;seq=7>)
- [5] Stratmann, H. G. *Using Medicine in science fiction: The SF Writer's Guide to Human Biology*. Cham: Springer, 2016. Print.

Chapter 12 Bibliography

- [1] Matt Novak, (author of Paleofuture Blog), "The Episode Where George Jetson Rages Against the Machine", (<http://www.smithsonianmag.com/history/the-episode-where-george-jetson-rages-against-the-machine-146315456/>)
- [2] Guy J. Lavoipierre (Former Epidemiologist, World Health Organization, Geneva, Switzerland), "Modern Medical Practices: A Commentary, (<http://www.eolss.net/sample-chapters/c03/e6-59-01-01.pdf>)
- [3] Neil Ungerleider (Los Angeles-based reporter for Fast Company), "The 10 Greatest Challenges for Modern Medicine", (<http://www.fastcoexist.com/1679684/the-10-greatest-challenges-for-modern-medicine>)
- [4] Joyce Newman Giger, Ruth Davidhizar (Both Healthcare professionals), Cultural beliefs: The effect on care, (<http://www.modernmedicine.com/modern-medicine/content/cultural-beliefs-effect-care>)
- [5] Frederick G. Kilgour (Librarian), "Modern Medicine in Historical Perspective", (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC197776/pdf/mlab00190-0069.pdf>)
- [6] Bernadine Healy, M.D. (Medical Doctor, Health Editor for U.S. News & World Report), "How Technology is Changing the Medical Profession" (<http://www.usnews.com/education/articles/2009/04/22/how-technology-is-changing-the-medical-profession>)
- [7] Joan Spitrey (RN, clinical nursing instructor), "The medical world is changing – How can we keep up?", (<http://exclusive.multibriefs.com/content/the-medical-world-is-changing-how-can-we-keep-up>)
- [8] Westby G. Fisher, MD, (Medical Doctor, NorthShore University HealthSystem), "The medical field is a-changin' – should how we teach doctors change, too?", (<http://medcitynews.com/2011/12/the-medical-field-is-a-changin-should-how-we-teach-doctors-change-too/?rf=1>)

Chapter 13 Bibliography

- [1] Matt Novak (author of Paleofuture blog), Telemedicine Predicted in 1925, (<http://www.smithsonianmag.com/history/telemedicine-predicted-in-1925-124140942/?no-ist>)
- [2] Ryan Winter (); The History of Physicians/Doctors, (<http://blog.soliant.com/careers-in-healthcare/the-history-of-physicians-doctors/>)
- [3] The Self-Pay Patient, "Growing bureaucracy in American medicine", (<http://selfpaypatient.com/2014/03/10/growing-bureaucracy-in-american-medicine/>)
- [4] Sandeep Jauhar, "Why Doctors Are Sick of Their Profession", (<http://www.wsj.com/articles/the-u-s-s-ailing-medical-system-a-doctors-perspective-1409325361>)

- [5] Royal College of Physicians, "Doctors in society: medical professionalism in a changing world", (<http://shop.rcplondon.ac.uk/products/doctors-in-society-medical-professionalism-in-a-changing-world?variant=6337443013>)
- [6] Richard Horton (Physician and editor of *The Lancet*), "What's wrong with Doctors", (<http://www.nybooks.com/articles/2007/05/31/whats-wrong-with-doctors/>) (Not sure if correct author and title)
- [7] Drew Hendricks (Tech writer), "How Technology Is Changing the Medical and Health Care Field", (http://www.huffingtonpost.com/drew-hendricks/how-technology-is-changin_b_3273542.html)
- [8] Bangalore and Framingham, "Squeezing out the doctor", (<http://www.economist.com/node/21556227>)
- [9] Futuristgerd.com, "The Future of Medicine: Squeezing out the Doctor? (The Economist) Me: or... setting doctors free?", (<http://www.futuristgerd.com/2013/04/29/the-future-of-medicine-squeezing-out-the-doctor-the-economist/#>)
- [10] Lizzy Goldsmith, "The Role of the Physician in Society: Doctors in the Media", (https://med.stanford.edu/content/dam/sm/bioethics/documents/arts/H%26P_journals/Summer07PDR.pdf)
- [11] Phillipa Soskin, "The Role of the Physician in Society: Doctors as Policymakers", (https://med.stanford.edu/content/dam/sm/bioethics/documents/arts/H%26P_journals/Summer07PDR.pdf)
- [12] Michael Bokoch, "The Role of the Physician in Society: Doctors as Scientists", (https://med.stanford.edu/content/dam/sm/bioethics/documents/arts/H%26P_journals/Summer07PDR.pdf)
- [13] Alana Frost, "The Role of the Physician in Society: Doctors as Writers", (https://med.stanford.edu/content/dam/sm/bioethics/documents/arts/H%26P_journals/Summer07PDR.pdf)